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NEW BBC MICRO



ISSN 0263-7456

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BBC ACORN USER

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Upgrade service available for original Acorn Plus 1 please call for details

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The popular BBC music synthesizer available for Electron users. Required 1MHz buff (see AP5). Supplied as M5000 Synthesizer hardware, 16k ROM, disc utils, and full documentation.

£99 excl VAT; £113.85 inc VAT

Please state 3.5" ADFS/5.25" DFS

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A unique interface for those wanting the maximum expansion from just one slot in the PLUS 1 AP5 contains:- A User port for connecting peripherals such as a mouse. 1 MHz bus allowing Music 5000(e), prommers and various control devices to be added. Tube interface for connecting and Acorn 2nd processor or even a Master Turbo board (through a 'Co-Pto Adaptor') - & TWO spare ROM sockets (1 high priority). All hardware connections are Acorn compatible thereby allowing many BBC products to be added (remember that some software modification may be necessary for the Electron). So although some expansion options may appear expensive on an Electron you do have upward compatibility.

£55.00 Ex VAT; £66.70 inc VAT

Advanced Plus 2 ROM

We feel this is one of the best, low cost, additions we have produced for the Electron & +1 user, especially for Plus 3, AP3, ABR & AP7 users now with this easy to fit upgrade you can add:

1) Fix for Tape filling system in Hi-res screen modes. 2) * ROMS- displays ROM/ROM images present. 3) * UNPLUG disable ROM/RAM image. 4) * INSERT - enables or inserts a previously unplugged ROM. 5) * KILL - totally disables the Plus 1. 6) * LOCK - locks a sideways RAM bank in ABR, AQR, AP7 7) * LROMS - locks all sideways RAM banks found. 8) * UNLOCK - to unlock a sideways RAM bank in ABR, AQR, AP7 9) * UROMS - to unlock all sideways RAM banks found. 10) * SAVEROM - saves a ROM image to current filing system. 11) * LOADROM - loads a ROM image from current FS into a RAM bank. 12) * FORMAT - will format an ADFS disc for Plus 3 or AP3. 13) * VERIFY - tests every sector on an ADFS disc. 14) * VFORM - formats and verifies an ADFS disc in one command. 15) * BUILD - creates a text file that can be used by *EXEC (ie !BOOT). 16) * LIST - displays a numbered listing of a text file 17) * TYPE - displays a file on screen with no line numbers. 18) * DUMP - to view a file's contents on screen. 19) * LANG - selects a default language to be booted on {CTRL-BREAK} 20) * HELP - provides a full 'help' list on all the ROM's commands. 21) * AQRPAGE - selects specified page in AQR.

Now there is no need to search for your utilities disc every time you want to Format/Verify a disc, Build a !BOOT file or lock/unlock/Load a ROM image into ABR PLUS much more . . . . . the ideal companion from the company that produces the Acorn Plus 1.

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The AP2 is the definitive Plus1 ROM. . . . .I'm not sure what i'd do without it. . . . .like all of PRES's other products, it's been well worth waiting for" July '88

FILING SYSTEMS

ADFS VERSION 1.1

Suitable for existing Plus 3 or A.P.4 users. This new version has the software fixes for Zysyshelp, write protect disable & compaction. Also Winchester code has been replaced with the necessary driving software to handle AQR as a 256k RAM DISC. Please note - ADFS is Acorns adopted standard filing system supplied on the Plus 3, Master 128, Master Compact & now the Archimedes. Supplied on 16k ROM with Welcome disc & utilities. Please state 3.5/5.25 welcome disk.

£14.95 ex VAT; £17.19 inc VAT

(ADFS manual supplied separately)

ADFS EOO

For Electron users with either Plus 3 or A.P.4 and 32k of S/W RAM i.e. ABR. All the benefits of ADFS but without all the loss of RAM! Includes all the software 'fixes' call for managing the new & original ADFS. One of the most frequent question we are asked: "How do I get back the memory lost on my Plus 3 system?" Answer: PRES ADFS & EOO regains 3.75k leaving page @ &EOO the same as Tape!

ADFS EOO supplied; 3.5 ADFS (manual available separately)

£14.95 ex VAT; £17.95 inc VAT

5.25 ADFS (manual avail. sep.) **£14.00 ex VAT; £16.10 inc VAT**

5.25 DFS(2 discs+ADFS manual) **£19.00 ex VAT; £21.85 inc VAT**

(See Special Package Prices)

DISC INTERFACES (Plus One required)

AP3 INTERFACE: As supplied with AP3 package. A fully Acorn compatible disc interface that will accept any standard 5.25 or 3.5 80T drive with PSU. It runs Acorn's ADFS (as supplied on Acorn Plus Three, Master 128, Master Compact and now the Archimedes) supplied with A.D.F.S. manual and welcome disc + Utilities and 3 bonus games (please specify 3.5 or 5.25 80T format). Also provides a spare 16K rom socket. **Price £52.00 ex VAT £59.80 inc VAT**

AP4 INTERFACE: A fully Acorn compatible disc interface that will accept any standard 5.25 or 3.5 drive with PSU. It runs the 1770 DFS (as fitted in the BBC 'B' and Master) keeps pace at &EOO - has utilities in rom and provides a spare 16K rom socket (DFS manual included. **Price £60.83 ex VAT £69.95 inc VAT**

AP34 INTERFACE: Get the best of both filing systems. Now available from PRES the ultimate interface. Fitted with both Acorn approved filing systems. . .Acorn's current standard ADFS and Acorn 1770 DFS (which can be run at &EOO) ADFS and DFS manuals supplied + ADGFS welcome disc with utilities.

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3 ½ ADFS £9.99 ex VAT £11.49 inc VAT

5 ¼ DFS. £8.99 ex VAT £10.34 inc VAT

View the Acornsoft word process for the Electron & +1 inc. full documentation — £14.94 inc VAT

ViewSheet The Acornsoft. . . . . spreadsheet for the Electron & +1 inc. full documentation — £14.95 inc VAT

View & ViewSheet special price . . . . — £22.00 inc VAT

SPECIAL PACKAGE PRICES

AP1 + AP3	£139.00 ex VAT	£159.85 inc VAT
AP1 + AP6	£77.00 ex VAT	£88.55 inc VAT
ABR + 3.5" ADFS E00	£48.65 ex VAT	£55.95 inc VAT
ABR + 5.25" ADFS E00	£46.95 ex VAT	£53.99 inc VAT
ABR + 5.25" DFS (ADFS E00)	£51.00 ex VAT	£58.65 inc VAT
AP5 + Music 5000	£152.17 ex VAT	£175.00 inc VAT
AP7 + 3.5" ADFS E00	£49.52 ex VAT	£56.95 inc VAT
AP7 + 5.25" ADFS E00	£48.65 ex VAT	£55.95 inc VAT
AP7 + 5.25" DFS (ADFS E00)	£52.13 ex VAT	£59.95 inc VAT
AP4 + CS400	£147.78 ex VAT	£169.95 inc VAT
AP1 + AP4 + CS400	£189.00 ex VAT	£217.35 inc VAT

********** ACCESSORIES **********

	ex VAT	inc VAT
Electron power switch This useful accessory provides a double-pole in-line switch with a new power jack-plug already attached; just connect to the existing lead, having removed the old jack-plug.	£3.96	£4.55
Plus 3 2nd drive adaptor converts the fitting at the back of the original drive which has been configured to Drive 1.	£6.91	£7.95
AP3 2nd drive lead replaces existing drive cable with one containing an extra connector for adding a second drive configured as Drive 1.	£5.96	£6.85
Electron Advanced Users Guide		£3.95
ADFS Guide Manual		£5.00
DISCS 3.5 10 in plastic library box		£19.95
5.25 twin gift pack		£1.49

M = Master B = BBC C = Compact E = Electron

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NEWS

Little Acorns from big Macs



A range of connectivity products enables would-be Beeb owners to use their Apple Macintoshes like BBC micros.

The suite of programs from Human-Computer Interfaces help to transfer programs between the two machines, use the Macintosh on Econet, and even write programs in BBC Basic on the Mac.

Human Computer Interface has developed the programs in conjunction with Apple for schools which have bought a Mac but still want to use BBC software, especially programs they have written.

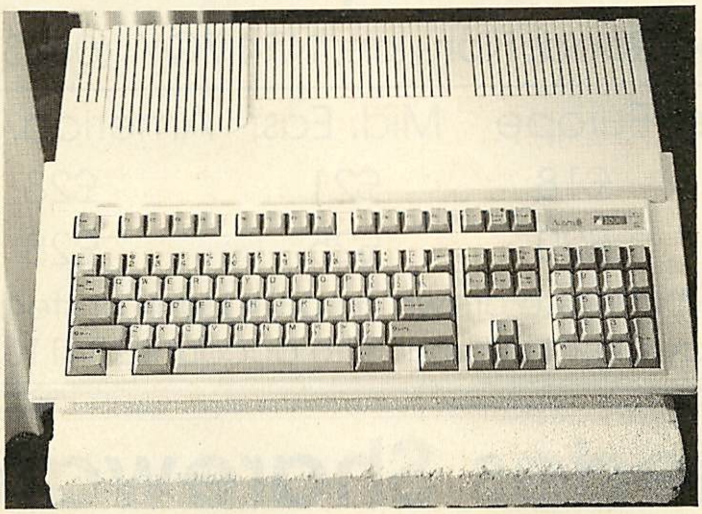
Apple's director of marketing, John Leftwich, explained 'We understand the importance of sustaining the existing hardware investment'.

The range includes a new version of the company's BBC Basic which for £171 will now run most well-behaved BBC applications and emulate the BBC micro's graphics and sound. Most important operating system calls are supported as is assembly language.

The BBC Emulator will allow BBC micro ROM applications programs other than BBC Basic to be run on the Mac. ROMs can also be copied from a connected Beeb into the Macintosh. The emulator costs £45.

The third of the utilities, *BBC>Mac*, puts the BBC filing system on the Macintosh desktop, allowing programs to be loaded from networks and discs, and costs £109.

Acorn back home with new micro



The new BBC micro is here and like the original Beeb in its time, the A3000 pushes back the limits of home computing. Other magazines have been speculating on the nature of the new micro for some months but the truth is now out in full in *BBC Acorn User*.

The new A3000 is a 1Mb Archimedes with a similar specification to the Arc 310, in a single case not much larger than the keyboard.

It is a BBC micro with the full backing of the BBC and will be selling for £649 +VAT – little more than a Master system – which will give other new generation home micros such as the Amiga and ST a run for their money.

With 1Mb RAM and the same ARM chip set used in the Archimedes range, the A3000 is fully compatible with the existing Arc range and is supplied with the Risc OS operating system.

It is equipped with a single built-in floppy disc drive, colour and mono monitor outputs, Centronics printer port, stereo sound and a single 'podule' expansion slot. Serial and Econet interfaces can be added as options.

The A3000 will be available for the first time at the *BBC Acorn User* show at Alexandra Palace on July 21-23rd and a detailed look at the new micro's specification is given on page 58 of this issue.

■ Although only one podule slot is provided on the A3000, already Pres is exploiting the expansion potential of the new machine. Pres is producing a low cost monitor plinth for starters and a podule box for a single exposed podule.

Acorn 3000 POWER DISC

Also coming is an internal expansion to provide a user port and external disc drives. This in turn will be further expandable to give a 1MHz bus connector (which should please educational users).

A fast analogue port (compatible with the Beeb's) will also be available to add to an expansion interface in the podule box. Further RAM and ROM expansions are also planned.

The plinth can be upgraded to house the external drives above the micro and a choice of a hard disc plus two 3.5-inch or one 3.5-inch and one 5.25-inch floppy are planned.

Prices are not yet fixed but Pres expects most of the expansions to be available alongside the official launch of the A3000 at the *BBC Acorn User* show in July.

■ The existing range of Archimedes micros is being rationalised to make way for the new machine. The 300 series machines are being phased out to leave the new A3000 as the low end micro.

Additional models are being added to the 400 series. The 410/1 (£1,199 + VAT) and 420/1 (£1,699 + VAT)are essentially variations on the original 410 which never saw the light of day, with 1Mb or 2Mb RAM plus 20Mb hard disc respectively. No hard disc is included with the 410/1 machines but the control circuitry is there so it is just a case of plugging in the hard disc of your choice.

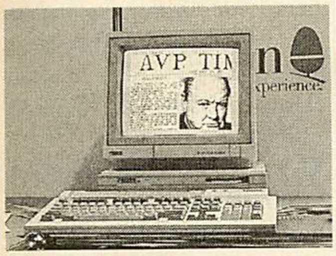
1st Movement

Hybrid Technology, which makes music systems for the BBC range of micros, has been so successful over the last few years that it has moved to the prestigious Cambridge Science Park, although the old premises will be kept on as warehouses.

The Science Park, owned by Trinity College, Cambridge, is home to many of the high tech companies which were part of the Cambridge phenomenon of the early 1980s.

To celebrate the move, Hybrid is offering a free tape of *Hybrid's Greatest Hits*, featuring music created with the system, to the first 30 *BAU* readers to write in with a large stamped addressed envelope to Hybrid Technology Ltd, 273 The Science Park, Cambridge CB4 4WE.

We're sorry



Full apologies to AVP of Chepstow for confusing its Archimedes DTP package *Pixel Perfect* with Acorn's yet to be released *Acorn Desktop Publisher* in BAU'S recent *The Software Show* supplement.

Pixel Perfect is the only native Archimedes DTP package currently available, and runs under both Risc OS and Arthur. A new version of the £91 package is currently being prepared and this will make more extensive use of the new Risc OS facilities, according to AVP's Laurence Nairn.

Further details of the program are included in AVP's extensive educational catalogue, published last summer. An updated catalogue will follow in the Autumn.

Acorn's future now looks rosy

Acorn's performance during 1988 was better than it has been for some time. Turnover and profits are up on the previous year and the signs are that Acorn as a company is on the up.

Turnover for the whole Acorn group increased from just over £36 million in 1987 to £39.2 million – a respectable, if not remarkable 8.5 per cent increase.

However, the Custom Systems Division, involved in such projects as the Communicator was closed at the end of 1987 so for the turnover of the mainstream business there has been a much more impressive rise of 16 per cent.

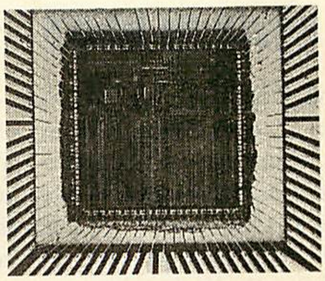
Acorn's turnover is in this healthy state because of continued high sales of the Master range. The 200,000th Master was recently delivered and Acorn claims demand still good.

Over 50 per cent of Acorn's business last year was with education although the commitment to home users remains strong. A recent Times Educational Supplement survey said 62 per cent of all computers sold to education in 1988 were from Acorn.

All this has contributed to a healthy increase in Acorn's profits for last year. After the loss of nearly two and a quarter million pounds in 1987, the books for 1988 show a 'net cash inflow' of £7.1 million.

This has enabled the company to pay off the overdraft, put £2.5 million away for a rainy day and still have £1.6 million left over as real profit.

With this more solid financial foundation to start 1989, the rationalisation of the existing range and the new micro, the future for Acorn looks rosier now than it has for some years.



Faster ARM

Acorn's research division has built the next super-fast RISC chip, the ARM3 with 300,000 transistors – 12 times as many as the Arc's ARM2, above.

The basic RISC processor is the same. The extra is a fast RAM 'cache' which means the chip works several times faster. ARM3 chips can work nearly four times faster than the Arc.

■ The ARM3 cannot just plug into an Arc or R140. It has more pins and requires some extra circuitry. An Acorn ARM3 micro is unlikely to appear until 1990 but Aleph One is already promising a 24MHz ARM3 upgrade for Arc and R140 users.

The upgrade runs Risc OS and Unix at up to five times normal speed. A launch price of 'a few hundred pounds' is expected.

It's showtime

A wide range of companies will be demonstrating their latest products for the Acorn range of machines at the *BBC Acorn User* show in July. Companies who have already signed up include Acorn itself, BBC Enterprises, Beebug, Computer Concepts and Hybrid Technology.

Of course *BBC Acorn User* will be there in force too and staff from the magazine will be on hand to help with your computing problems.

Whether you choose to buy anything or not, if you visit the show you could go home with a new Acorn computer or a bundle of software. Every ticket will be entered into a daily prize draw.

If you buy your ticket in advance there's a pound off the entrance fee, so it's £2.50 for adults and £1.50 for children. On the day, tickets will cost £3.50 and £2.50 respectively and you may have to queue! To get your tickets send a cheque or postal order to Safe Sell Ltd, Market House, Cross Road, Tadworth, Surrey KT20 5SR.

If you'd like to get in free, win an Arc, and stay in a luxury hotel, see our competition on page 28.

New Arc art

Clares' near monopoly of Archimedes art software has been broken by the *Art Nouveau* package from Computer Assisted Learning.

The program produces 256 colour pictures and requires at least 1Mb RAM. CAL claims the package offers most of the facilities of *ProArtisan* but it costs only £42.50.

A novel feature is a 'scratch screen' held in memory and used for sketching, brush design and the like. Pictures from the scratch screen can then be copied or merged with the main screen.

Licences for copying by educational users are also available.

NEWS IN BRIEF

■ When the National Farmers' Union displays the joys of country life to visitors to the Hyde Park Festival in May, it won't be using fluffy bunnies or heaps of manure, but a BBC Domesday System running the prize-winning Countryside disc.

The festival of Food and Farming runs from May 4 to May 7, with the first two days reserved for London school children.

The National Farmers Union worked with the BBC to ensure the disc was as accurate as possible in its representation of a working farm.

■ Micronet is setting up a petition against newly-imposed VAT charges on electronic and Prestel services which will affect its subscription prices.

'VAT shouldn't be charged on information and it's something we are currently objecting to very strongly,' said marketing services manager, David Rosenbaum.

Readers keen to voice an opinion should contact Micronet direct. In the meantime, its reduced quarterly subscription offer of £9.95 has been extended to the end of June – but don't forget to add VAT!

■ A nearly free book is always worth a look and when it's useful into the bargain, there's no reason not to partake.

Publish! An Author's Guide To Doing It Yourself Using Desktop Publishing is available for the price of just three first class stamps.

The 32-page booklet gives some general hints and details the methods of desktop publishing using the publishers, Neal's Yard DTP Studio.

Send your three stamps to Neal's Yard DTP Studio, 2 Neal's Yard, London WC2H 9DP.

Brainwave



Brainsoft gets the picture

Brainsoft's multiple input/output board provides a lot of add-on interfaces for the Archimedes, and at a reasonable price too.

The main addition the board makes is a video digitiser. This has no on-board memory cache for real-time frame grabbing but in about two seconds it can grab a video image from a camera or VCR in 256 shades of grey — ideal for artistic or DTP work.

The same chip used for video digitising can also be used for sounds. Stereo sound can be sampled and stored in the Arc and then manipulated.

The Brainsoft podule includes an RS232 port, a joystick interface and ROM sockets to accept chips up to 128k.

Software to use the podule is included on-board and provides a range of SWIs and star commands. The board costs £123 from Brainsoft.

More books

Master 512 owners can gain an introduction and reference to the system with a new user manual from Dabs Press. Simply entitled *Master 512 User Guide*, it's penned by Chris Snee and costs £9.95. For the extra price of £14.95, it comes complete with a DOS utilities disc.

Also newly published from Dabs is *Basic Five: A Dabhand Mini-Guide* by Beebug editor Mike Williams, priced £9.95.

CUSTOMER HOTLINE

■ Welcome to another Customer Hotline column. In case you have missed previous columns, the aim is to inform you of the latest happenings in the Customer Services Department at Acorn. This includes application notes you can obtain from us, what is happening on SID (Acorn's Support Information Database) and reminders on how to obtain technical support.

■ We now have a Space News magazine on SID which may prove of interest to budding astronauts! It is being written by Geoffrey Lindop and details shuttle and satellite launches. The Risc OS forum has also started but this is only open to registered users, so why not take advantage of the SID trial offer and write to Customer Support for an application form?

■ If you want to find out more about SID, try the guest system on (0223) 243642. You will need Viewdata terminal software set to 1200 baud receive, 75 baud transmit, 7 data bits and even parity. This will allow you to see much of the system without becoming a registered user.

■ Application note time! If you have ever had problems with *ViewStore* or wanted to write your own utilities to go with your *ViewStore* databases, here are the documents for you.

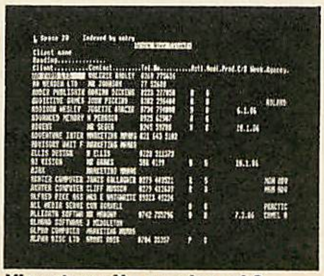
The first is *ViewStore Hints and Tips*. It covers a wide range of common queries from using *ViewStore* with DFS 0.90 to using the Convert and Import tools. The second document is called 'How to write a *ViewStore* utility' and was written by Mark Colton, the author of *View*, *ViewSheet* and *ViewStore*.

Not for the squeamish, this 31-page document goes into the format of a utility and describes each ROM routine in turn. These routines cover using the datafiles, accessing fields and records, manipulating the indexes and controlling the printer, among other things. *BBC Acorn User* would be interested to see any utilities you do write. Who knows, we may even publish them . . .

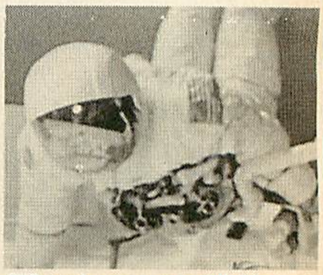
Both these applications may be requested free of charge from Customer Support or downloaded from SID. The SID reference numbers for the documents are 0230010 (*ViewStore Hints and Tips*) and 0230020 (How to write a *ViewStore* utility).

■ There has been a good response to the application notes mentioned in the column so far, but is there any particular subject you would like to see covered? If there is, let us know.

■ Just a reminder about writing to Customer Support. To ensure the mail reaches us quicker, the proper address is
Customer Support,
Acorn Computers Limited,
Fulbourn Road,
Cherry Hinton,
Cambridge CB1 4JN.



Viewstore: No worries, eh?



SID makes space available

APPOINTMENTS

Acorn Computers Ltd. is already established worldwide with its high performance quality computer systems and is the only company in Europe to have developed its own RISC processor. We are constantly striving to improve existing products and have an impressive development programme for new products and new markets. As an Acorn user you may have the skills we need to ensure that our programme stays on course.

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To manage the transition of hardware products from Research and Development into the field, defining the service strategy and ensuring it is implemented.

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Candidates should be educated to degree level, ideally in engineering or electronics and possess strong planning and organisation skills. Field service management experience is also required.

Ref AU/JG/010

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Using the latest in state-of-the-art technology, you will be employing your sound programming skills, ideally gained with Unix, C, Pascal or Modula 2, to test and validate the software and firmware elements of all Acorn products. There is much liaison with internal resources and third party auditors and we seek applicants at engineer and senior engineer level who thrive in an environment working to high standards and tight deadlines.

Ref AU/AC/003

UNIX SUPPORT SPECIALIST

Ideally a Computer Science graduate with at least 2 years in-depth Unix experience, including System V on Ethernet, with associated packages. A professional appearance and good interpersonal skills are essential as the role also entails attendance at exhibitions and dealer/distributor events. The successful candidate will liaise closely with Research & Development and Software Quality Assurance staff in order to maintain and expand his/her Unix knowledge.

Ref AU/JG/001

SNR TEST/ DEVELOPMENT ENGINEER

A working knowledge of BBC Basic, Assembler and "C" is required for this position, together with the ability to guide and direct a small team.

Experience in Winchester disc software, Unix O.S. and SCSI would be very desirable together with the ability to accept project responsibility with the minimum of supervision.

Ideally we seek candidates with a degree in computing or electronic engineering to develop software and hardware facilities for the testing of computer systems and peripherals.

Ref AU/GB/009

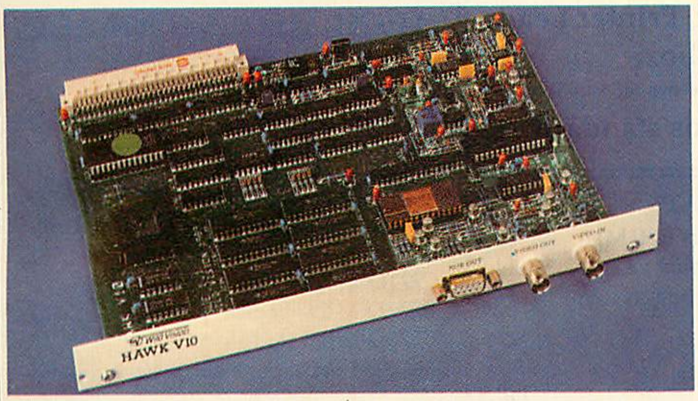
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To apply for any of these positions, please write with full career details to Mrs. Janet Henson-Webb our Senior Personnel Officer at Acorn Computers Limited, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Telephone: 0223 245200.

Acorn
The choice of experience.

Arc moves into professional video



The Archimedes' potential for high quality image processing is being exploited by yet another video add-on board.

Manufacturer Wild Vision claims its new Hawk V10 expansion card can perform standard processing algorithms faster than PC and framestore systems, and is aiming the product at science research and industry.

Two monitors control the system, one to display the image being manipulated and one to display menu commands. The software supplied runs under Risc OS. The Hawk V10 can capture images every 50th of a second either in colour or in a scale of up to 256 levels of grey.

The image grabbing is all done on the card leaving the micro free for any image processing and manipulation.

The Hawk V10 is a double width card and requires the space of two podules on the backplane. It will work just as well on 300 as it will on 400 series machines.

The complete package of the Hawk V10 card and control software costs £747 from Wild Vision.

Boost for games

Several major games publishers have banded together to form an association with the intention of stamping out software piracy and promoting computer games.

The Entertainment Software Publishers Association will also commission research into the games market so that real sales figures will be available rather than the inevitably exaggerated claims put forward by manufacturers.

Leading games publishers like Mirrorsoft, US Gold, Grand Slam and Hewson have already joined and several more are poised to join up.

ESPA plans to work with organisations such as FAST (Federation Against Software Theft) to combat the copying of software.

The association also intends to publicise computer games through press and TV advertisements. When you think of the size of the games market and the number of magazines about them on newsagent's shelves, the scale of the business is not reflected on TV and in the papers' said ESPA publicist Michael Baxter. 'We aim to change that'.

THE COMMS COLUMN

■ Tandata Holdings, manufacturers of many fine modems including the TM512P schools modem has been bought for £5.28m by AB Electronics, the well known manufacturers and distributors of Acorn products.

The new group will have a combined turnover of £200m and over 4500 employees in five countries.

Dr Chris Dobbing, who runs the Healthdata community health information system, has so many callers that he has now installed a second line, using a shared system so the number for both lines is still 01-986 4360.

Even after four years, Chris is still getting 25,000 calls a year and on the very day the new line was installed, there was an instant increase of 20 per cent!

Sysops may be interested to know that having two lines on the same number doesn't cost any more, and is no more difficult to install.

Despite initial pressure from BT to insist that a second line must be a business line, Chris stuck to the argument that Healthdata was a hobby and so only private installation and rental charges applied, and BT North London District conceded.

This is worth remembering when you apply for a second line for your board!

■ Two new ACMB bulletin boards have set up this month – Beyond Belief BBS running 24 hours on (0642) 780925 (viewdata only) and Womble Base II (based, as you might expect, in Wimbledon) on 01-979 9606 (6pm-11pm only, viewdata or scrolling).

Both boards work on 1200/75 baud and both are ringback boards: you must call, let the phone ring twice, hang up, call again, and wait for the computer to answer. Marcus Anselm, also part of the ACMB network, reported these two new boards. His own board Marctel (01-346 7150) has just had a 20Mb hard disc installed and this means there will be greatly expanded features and downloads from now on.

■ Still more BBs! Patrick Cain from Wellington, New Zealand, informs me that there are 22 bulletin boards in the city, supporting only 200 users.

The BBC board in Auckland is run by the Auckland BBC User Group and I am sure they would welcome any British and Irish callers on Auckland (010649), from the UK, 534-8414 on 300/300 and 1200/75 baud.

■ Due to a gremlin in the system somewhere, the featured board in the April column, ESoftC, somehow had its telephone number omitted. The number is (0767) 50511.

■ Featured bulletin board this month is AIX-386, so called because it is an Access Information eXchange, running on an 80386 PC. The Worcester-based system has conferences running for general Acorn computers and for the Archimedes.

At the moment an Editor is required for the Archimedes section and interested parties should contact the sysop, J W Brooks, through the board.

AIX is a large board, with over 3000 users of various machines, 360Mb of storage, five lines, and over 300 international callers. The system runs 24 hours a day and the five numbers (all prefixed with 0905) are 52536, 58030, 57822, 754127, and 754121.

If you have any comms news please send it to The Comms Column, BBC Acorn User, *20-26 Brunswick Place, London N1 6DJ. You can send it via Telecom Gold: 81: RED001.*

NEWS IN BRIEF

MESU/NCET have released new material to support the use of micros in schools. *Learning Geography With Computers* is a set of software, case studies and support material designed for use in middle and secondary schools.

The software component includes *Grass, Front Page Extra, Sand Harvest* and *Drainage Basin Simulation* along with a variety of other material from Longman, Granada and the Advisory Unit. The pack costs £45 plus postage.

A second pack tackles Home Economics and includes *Touch Explorer Plus* and *Prompt/Writer* and comes with Concept Keyboard overlays.

■ Three new books have also been released. *Girls and the New Technologies* is a set of photocopiable material for use on two INSET courses tackling the issues of girls' participation in the use of new technology. *New Technology in Primary Mathematics* is also a suite of resources for supporting INSET, aimed at course providers.

The Advisory Teacher's Diary is amusing catalogue of the activities of fictitious advisory teachers for IT, based upon submissions from some of the 650 who were appointed under the ESG scheme.

All are available from Hoddle Doyle Meadows. Enquiries should generally be addressed to NCET Coventry.

■ *Powerkey* (£32) from Unusual Software allows disabled computer users to define normal keyboard keys to produce long strings of characters in much the same way as function keys. Two consecutive keypresses are required to activate the facility.

■ *Printmaster* from LTS is a poster, banner, letterhead and greetings card designer which runs on the Arc under PC emulation. It comes with a range of clipart to complement your design.

Micros for all says report

Every classroom in the UK should have a computer system and teachers should be encouraged to buy their own micros according to the Centre for Applied Research in Education at the University of East Anglia.

The Centre's recent report examines the impact and merits of the DTI's micros in schools Support Scheme which ran from 1981 to 1984.

The report claims that although the scheme got the system moving and established a base of IT materials in schools, there is still a need for more equipment and for better educational practice.



More micros in classrooms?

It praises the idea of advisory teachers but regrets the lack of research-based curriculum development projects.

The report goes on to recommend that every classroom should have a complete computer system with a printer in addition to a dedicated computer room.

On-line access to NERIS and PRESTEL is seen as a priority and the report concludes that funding of hardware and software must be continued by national government across the board. It looks for greater INSET initiatives and collaboration between national agencies to provide support to both LEAs and the classroom teacher.

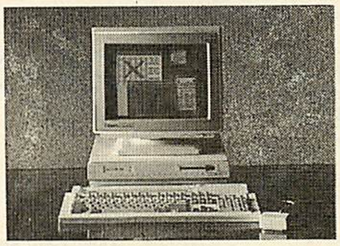
More controversially, it suggests that funding to secondary schools should depend upon the implementation of cross-circular initiatives and that all teachers should be offered tax or other incentives in order to acquire personal computers.

Unix for schools

Acorn is targeting its R140 Risc-based Unix environment at local financial management of schools and at general administration.

One of two software packages, *SIMS* or *SCRIPT* will be combined with the R140 workstation at a cost of £2,695. Under the scheme, schools will receive support both on-site and via a specially set up hotline from Granada Microcare.

It is anticipated that the system will not only provide



R140 goes to school

scope for the financial management of schools but will also aid the monitoring and recording of pupil testing which is now required under the National Curriculum.

Software on ITV

The ITV for Schools annual programme for the year from Autumn 1989 reflects its desire to exploit the latest in educational technology.

Twenty five of the proposed schools transmissions are supported by software, much of which is based around the well-known ITV *Key* database management system.

The new programme guide invites school-based and Teachers' Centre INSET coordinators to contact their local ITV offices for input from the organisation at courses for teachers.

Latest NCET studies

An evaluation of the role of the National Educational Resources Information Services (NERIS) will examine the accessibility of the system to schools and, in particular, its relevance for promoting and implementing the new National Curriculum.

NERIS is an on-line system and has recently been awarded funding by the DES for the next three years but after this time it will become a subscription- based organisation.

The second study concerns the relevance of remote sensing projects for learning and will tackle the issues of live and recorded satellite materials, and the claims of the value of such resources.

Should it prove worthwhile it is then to make recommendations to the DES on ways of promoting remote sensing.

Text editor for Arc C

Programs written in C can often be ported across from other machines and re-compiled on the Arc. There's a lot of utility software like this, and one example is *EMACS,* a text editor. It was written for DEC mini-computers, but there's a public version called *Micro-EMACS*. You can get this on the IBM PC, Amiga, and Atari ST, and now the Arc for a very reasonable £6.

EMACS lacks any facilities for printing and highlighting, and makes no use of the Wimp environment. Instead it offers dazzling speed and power and almost infinite configurability. Virtually the whole keyboard can be redefined with, for example, 156 possible different function-key presses.

The initial editing screen provides 'mode line', giving the current filename and describing any 'modes' (overtype, etc) which are active and a command line.

On an Archimedes 310, some 50,000 words can be held in memory. Any screen mode is supported, and it may be changed while you're editing. *EMACS* has comprehensive search-and-replace facilities. The Crypt mode automatically encrypts and decrypts text files if desired for sensitive information for electronic mail.

My one criticism of Arc *EMACS* is the lack of printing facilities. However, it produces Ascii files which may be read into any word-processor. I would not recommend *EMACS* to an absolute beginner, but if you have even a bit of programming ability, then *EMACS* is unbeatable for intensive text-composition. And, at £6 you can hardly go wrong!

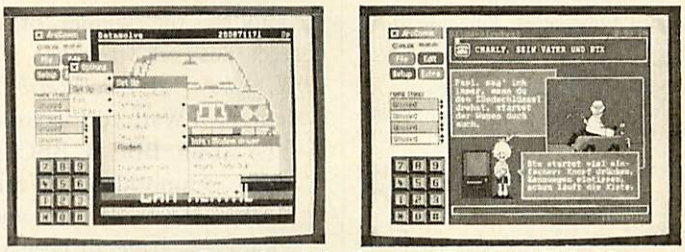
Jonathan Barnes

The Arc Communicates

ArcComm is among the small group of Risc OS applications for the Arc. It's a comms package intended for the average user, and it's pretty simple to use. Starting from the desktop, you double click on the telephone icon and it installs itself on the bottom icon bar. The menu attached to the icon gives a 'call and connect' option, which takes the phone number from a database on the disc. Your own phone numbers can be added to this list to give a self-contained comms terminal system.

ArcComm is run from Desktop but is displayed in a non-resizable window as it takes over the whole machine. The whole program is menu-controlled, with some keyboard shortcuts for experts. It doesn't use the typical Risc OS menus – it works the same but looks even better.

ArcComm supports CommunItel and Hayes modems and emulates Prestel-type graphics in all three CEPT levels (profile 1-3). This also allows you access to French



ArcComm accesses Prestel and the German Viewdata, Bildschirmtext

Viewdata (Minitel), and German Viewdata (Bildschirmtext) as well as Prestel. The continental standards have better graphics that are faithfully represented on screen. That even includes the three-level flashing of the German system! There's also a standard VT102 scrolling terminal. It's limited to Xmodem on file transfer, but most bulletin boards should meet this standard.

ArcComm works with most common modems, including the increasingly important Hayes standard devices like the Pace Linnet, Miracom WS series and Amstrad SM2400. These can be made to tone-dial if you have a System X telephone exchange in your area.

To use *ArcComm* you'll have to wire up your modem lead differently from the standard recommended by Acorn – the IBM PC AT standard. The diagram for *ArcComm* was given in the March issue of *BBC Acorn User* (page 135), though it's worth noting the Arc diagram might seem reversed. The view is from the rear of the plug (male), but the Arc end of the cable is a socket (female). The pin numbering should be swapped left for right when wiring up a socket.

ArcComm is a significant comms package; simple to use and with better presentation than the existing *Hearsay* and *ArcTerm,* though ultimately not as flexible for the technically-minded comms enthusiast as the latter.

Graham Bell

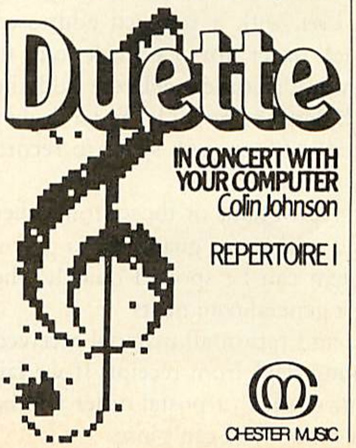
BBC micro in good company

Duette (on cassette only at £9.99) from Music Sales is an auto accompanist, suitable for most treble clef-reading instruments, a sort of computerised 'Music Minus One'. It has 12 tunes in its repertoire including Fur Elise, the Trumpet Voluntary, Chanson de Matin and An English Country Garden.

The arrangements consist of a melody line plus a one or two-part accompaniment. They are fairly simple and written in easy keys.

Two staves are drawn on the screen and the music on one lays while the other is being redrawn. It looks a little odd but it's quite easy to follow.

The computer can play a complete tune, but to prac-



tice, you mute the part on the screen and play it on your instrument while the other parts provide an accompaniment. *Duette* uses the suggested Sound value for each note that was given in the original User Guide – which puts it a good quarter tone out.

You can tune it, although the BBC micro can't hit International A (440Hz) exactly. If you've a good ear, you may have to retune your instrument.

That apart, *Duette* is fun and easy to use. It could even improve your sight reading.

Ian Waugh

Contacts

Acorn Computers, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Tel: (0223) 245200.
Apple Computer, 6 Roundwood Ave, Stockley Park, Uxbridge, Middlesex UB11 1BB. Tel: 01-569 1199.
AVP Computing, School Hill Centre, Chepstow, Gwent NP6 5PH. Tel: (0291) 625439.
BBC Soft, Woodlands, 80 Wood Lane, London W12 0TT. Tel: 01-576 2548.
Brainsoft, 106 Baker St, London W1N 1DF. Tel: 01-486 0321.
Clares Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire CQ9 7DA. Tel: (0606) 48511.
Computer Assisted Learning, Strathclyde Business Centre, Princess Road, New Stevenston, Strathclyde ML1 4JB. Tel: (0698) 733775.
Dabs Press, 5 Victoria Lane, Whitefield, Manchester M25 6AL. Tel: 061 766 8423.
Gnome Computers, 16 Histon Road, Cambridge CB4 3LE. Tel: (0223) 461520.
Human Computer Interface, 25 City Road, Cambridge CB1 1DP. Tel: (0223) 314939.
Hybrid Technology, 273 The Science Park, Cambridge CB4 4WE. Tel: (0223) 420360.
Interactive Media Resources, 8 North Street, Wolverhampton, West Midlands WV1 1RD. Tel: (0902) 25333.
Kyocera (UK), 8 Beacontree Plaza, Gillsette Way, Reading RG2 0BP.
Micronet, Telemap Group, Durrant House, 8 Herbal Hill, London EC1R 5EJ. Tel: 01-278 3143.
Music Sales, Distribution Centre, Newmarket Road, Bury ST Edmunds, Soffolk IP33 3YB. Tel: (0284) 702600.
PRES, 6 Ava House, Chobham, Surrey GU24 8LZ. Tel: (0276) 72046.
Wild Vision, 6 Jesmond Road, Newcastle-Upon-Tyne NE2 4PQ. Tel: 091-281 8481.

Archimedes Winner!

Our congratulations go to reader Brian Lepper from Brightons in Falkirk, the winner of our March competition. Brian's correct answers, together with his Archimedes slogan: *The Archimedes – A Risc Worth Taking*, wins him an Archimedes system from Watford Electronics. The correct answers were:

1. The Atom, BBC B, BBC B +, Electron, Master 128, Master 512, Cambridge Workstation, Communicator, the Archimedes 305, 310 and 440, the BBC Compact and Domesday have all been sold by Acorn. (We asked you to name five).
2. Acorn Computers was launched in 1979.
3. The managing directors of Watford Electronics and Acorn Computers are Nazir Jessa and Harvey Coleman respectively.
4. The Archimedes, Master 128 and Electron have 32, 8 and 8 'bits' respectively.
5. BBC Acorn User is the BBC/Acorn magazine with the highest circulation.
6. The Archimedes was launched in August 1987.
7. ARM Chip is the name of the Archimedes processor.

Our winner has been notified by post.

Diary dates

16-17 May. Ace Computer Systems Seminars, London. Demonstration of new spreadsheet, graphics and time management packages for LEX 9c. Contact: Alison Brown, ACE Microsystems, 01-847 4673.

18 May. Control Data, ICEM – CAD/CAM Workstation, Heathrow, London. Contact: Control Data. Tel: 01-848 1919.

6-8 June. European Unix User Show, Alexandra Palace, London. Contact: EMAP International Exhibitions, 12 Bedford Row, London WC1, Tel: 01-404 4844.

20-22 June. Electronic Publishing & Print Show, Wembley Exhibition Centre, London. Contact: Blenheim Online, Blenheim House, Ash Hill Drive, Pinner, Middx. Tel: 01-868 4466.

21-23 July. BBC Acorn User Show. Contact: SafeSell, (0737) 814060.

Apple has moved its offices from Hemel Hempstead to: 6 Roundwood Ave, Stockley Park, Uxbridge, Middlesex, UB11 1BB. Tel: 01-569 1199.

Hybrid Technology has also re-shuffled its premises and is now at: 273 The Science Park, Cambridge CB4 4WE. Tel: (0223) 420360.

BLUNDERBOX

There were a couple of errors in the series of Archimedes floating point articles in April and May. The first concerns the use of brackets in instructions like 'STFALE F3,[R0]' – these should be square brackets, not round brackets as shown throughout the two articles. The second relates to Table 4 in the April issue: the MNF instruction has the effect Fd=-FM. Thanks to author Tim Chappell for pointing this out.

Several mistakes have crept into the listings over the last two months. Even though many of you believe otherwise, there was only one 'but' in the Druid game from the April 1989 issue. Line 3750 had a comma missing and should have read:

```
3750 PROCa(write,write,
640-40)
```

See pages, 129 and 136 for more details. The ray tracing program in the May issue works fine but some readers may have problems when trying to use the changes for the Arc. After making the changes, delete line 100 and you will get the correct grey-scaled display.

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Please note: debugging readers' programs or those from other magazines is a complex task and we cannot guarantee to give a full solution. Unless this problem can be spotted quickly, the service will only be able to make general comments.

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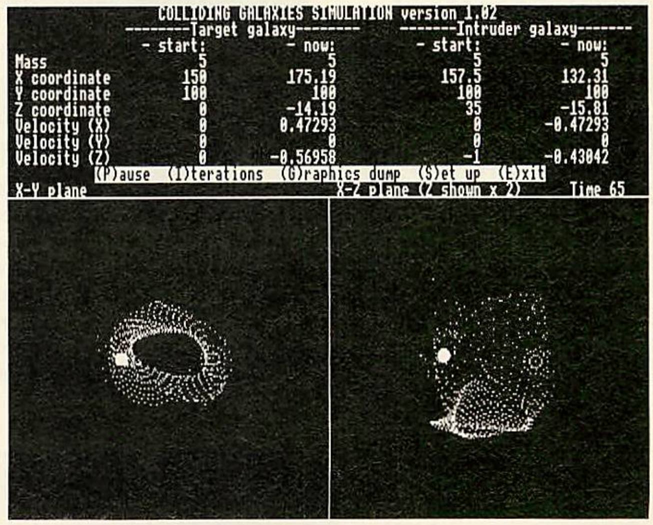
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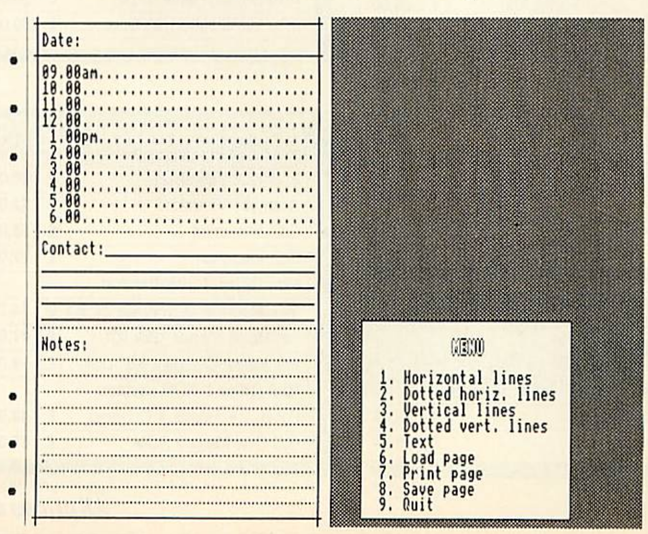
The July issue of *BBC Acorn User* is even more galactic in its proportions and universal in its coverage.

Next month *BAU* lets you collide galaxies in the privacy of your own home. Pick a couple of galaxies and smash them together on the screen – it's more fun than *Defender*, more educational than *Podd* and less genocidal than the real thing.

For the Archimedes owner with an interest in innards, the July *BAU* starts a short series on interfacing the Arc. How to use those podule slots, how to program the Arc for input and output and some pointers on the hardware side of things.

Also coming next month is the ultimate program for all you awfully organised Master-owning types. With *Fax Form* you can design, save and print pages for your Filofax-type organiser. Now you will be able to keep those all important *BAU* publication dates to hand.

Plus, of course, the July issue includes news of all the latest and greatest software and hardware to adorn Acorns everywhere.



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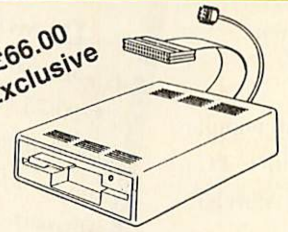
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HINTS & TIPS

JUSTIFY YOURSELF

This month we look at how to incorporate proportional spacing into justified text and at speeding up the ViewSpell dictionary

David Atherton

We start off this month with a utility I have written myself, partly in response to a number of requests I have had over the last year or two and partly because I always felt that it could be done, but no-one seems to have done it.

There is one type of print format which I have never seen on any wordprocessing package which uses both the printer's proportional spacing and full justification (like the text on this page).

This is relatively simple to achieve with a 24-pin printer with microspacing (see *BAU* September 1988) but for a 9-pin model without this feature the difficulty is that the computer cannot determine the width of each character.

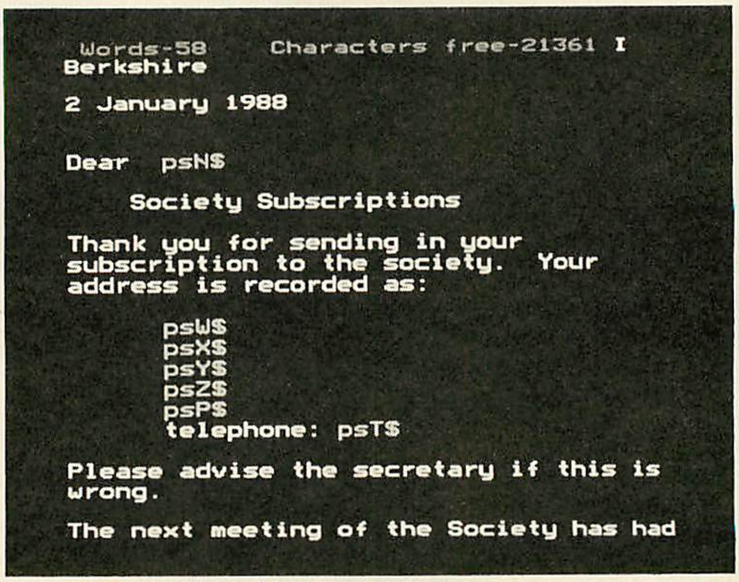
The way to solve this problem is to tell the computer what these widths are. The easiest way to do this is to print each of the 94 printable Ascii characters and measure their width with a ruler.

It is more accurate if you print a repeated sequence of the characters, so I ran a program as follows

```
VDU 2,1,27,1,ASC"p",1
,1
FOR I%=33 TO 126:P. S
TRING$(70,CHR$(I%)):NEXT
:VDU 3
```

I did this on my Star NL-10 and discovered that all the characters fall into groups of equal width. If the width of a line of non-proportional character is 12 units, the widths of the various proportional characters vary between three units (for full stop and exclamation mark) to the full 12 units (for lower case w and capital M and W).

This data is incorporated into the end of the justified printing program in the yellow pages with values for Ascii 32 to 126. The space character takes up a full 12 units, but a value of 0 has been entered in the table, as the inter-word spacing is determined by the program.



Justified text from any wordprocessor

```
The Iguana, and millions like it,
and millions more unlike it, for a
tropical rain forest contains a
wider variety of life forms than
any other environment - with the
possible exception of a sleeping
bag at a rock festival - all these
life forms had died in the service
of Slampacker. They had been
consumed along with the slice of
gherkin smothered in secret recipe
sauce.
```

All characters full into groups of equal width

With the character width data available, the next step was to write a program which calculated the length of each line, so that they would be of equal length when printed out.

Most right-justification programs work by checking how many words will fit on a line and how many spaces are 'left over', and then redistributing these spaces by adding them to the normal inter-word spaces. This works, but is rather unsightly as the words have unequal gaps between them. A better method is to use microspacing, dividing the spare space exactly between the words.

Normal 9-pin dot-matrix printers do not support microspacing in the usual way – only complete spaces can be printed. A way around this is to use the graphics mode of the printer and to print the graphics character 0 which moves the print head by one pixel, but doesn't print any dots. The units mentioned above equate exactly to one pixel printed in double-density graphics mode, so the calculations are quite easy.

The program scans along a line, reading each character, and totalling the widths of all the characters from the width table. Spaces are counted as full width (12 pixels) and when the limit is passed, the excess width is calculated, and is deducted in pixel terms from the total width of spaces. The new space width is then calculated, and the integer and fractional parts are separated.

This has to be very precise. If the new width is rounded to its integer values, the text still comes out with a ragged right edge, so the fractional part is multiplied by the number of spaces to calculate the total number of extra pixels to be inserted, and the new spacing gaps. A small routine adds one pixel to each space gap along the line until all the fractional adjustment has been made.

The variable minspc% controls the minimum inter-word spacing allowed. This is set to six (pixels) by default, half a normal space. You can alter this to any value from 1 to spcwid%. You can also alter the value of spcwid%, which will start with a larger default spacing.

Another variable which can be changed is ls%, which sets line spacing (set to 1 by default). The 'lines per page' setting is not affected – this should still be set to the number of lines, including blanks, on the printed page. I have not provided user options to change these variables, so you will have to amend the program.

In use, every line of text prints out correctly, both left and right justified, using printer proportional spacing. I have written the program so the left margin and text width can be set to any values you like. When you run the program it asks for the left margin and monospaced width of the text. Both values are used in normal monospacing calculations, so on an 80-column printer, replying with values of 5 and 70 would print with a 5 character margin on each side of the paper.

The program has been written to deal with whole paragraphs and it regards a paragraph as a chunk of text which finishes with a carriage return. Each paragraph is read into a memory buffer located at 'paragraph%' and processed from there.

When the widths are calculated, the text is not altered and is printed directly from this memory buffer. I could not use normal strings, as this would limit the length of a sentence to 255 characters.

The statement DIM paragraph% 2000 limits the size of a paragraph to 2000 characters. This can be adjusted but if using a BBC micro it is a good idea to work in mode 7 if you increase this value.

Since the program works on complete paragraphs rather than individual lines, the text file you prepare must contain whole paragraphs without carriage returns. Files saved in *Wordwise* are suitable without alteration, although they should not contain any control codes or 'green' embedded commands.

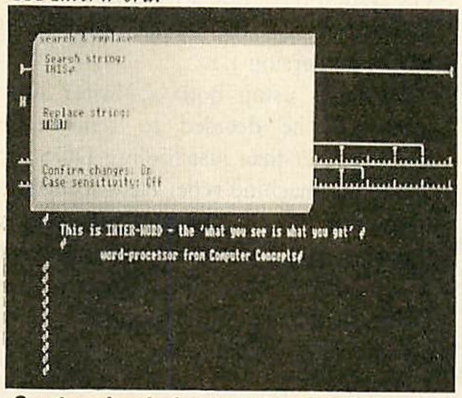
Files created with *Master Edit* are also suitable but *View* and *InterWord* files are not. *View* uses a carriage return at the end of each line which means that each line would be treated as a paragraph and the *InterWord* has several bytes of data at the beginning of each file.

I have written an additional program to convert *View* files to *Wordwise* format. This can also be used with spooled output files from other programs such as *InterWord.* Note that the converter program is fairly simple and simply joins all lines separated by single carriage returns and doesn't alter lines separated by double carriage returns. This means that sections of single line items, such as program listings, will be concatenated, much in the same way as the Format command of *View*.

The program doesn't cope with embedded Escape sequences for printer effects such as bold, italics and so forth as there is no lookup table.

£10 OVERTYPE IN INTERWORD

Isaac Hepworth of Sheffield, like many others, misses the overtype mode, present in most other wordprocessors, absent from *InterWord.* He has written a short machine code patch which effectively provides an overtype mode for *InterWord.*



Overtype is missing from *Interword*

To use the patch, run the program in the yellow pages, which creates a machine code file called OTYPE. Enter *InterWord*, and from the front menu, type *OTYPE. This will install the program.

When you enter the editing screen, you will be in the normal insert mode. To enter overtype mode, press CTRL-O. To cancel overtype mode, press CTRL-C. In overtype mode, cursor movement is as normal but if you type a normal character, it will appear on top of the character under the cursor, deleting whatever was already there.

Note that you must cancel overtype mode before you return to the front menu, otherwise characters typed at that point will appear twice.

The overtype mode actually works by inserting a character, and then deleting one, so the lines of text appear slightly jerky when you are typing using the mode. This is not a problem but beware of missing the odd character if you type very fast.

The program works by installing an event driven routine activated on event 2 (key pressed interrupt). Every time a key is pressed, the routine checks the ASCII value of the key. If it is below 32 or above 127, then it must be a CTRL sequence, function or cursor key and the routine returns, allowing normal processing to continue. Otherwise the code for the Copy key (&8B) is inserted into the keyboard buffer (which deletes the character just moved to the right). The routine then returns to allow the actual key pressed to be inserted. The net effect is an overtype mode.

You can change the keys which switch the feature on and off by altering the values of variables 'insert' and 'overtype' at the start of the listing before assembling the machine code. The feature can be permanently disabled at any time by typing *FX13,2 and reactivated by typing *FX14,2 from the *InterWord* menu line.

£5 ALTERATIONS TO ADFS WIPE

Dedicated View family user, T Payne of Mid Glamorgan has an Electron and points out that *ViewSpell* is terribly slow on this machine when running a document check against the dictionary. He has therefore devised an EXEC file which will do all parts of the job for him. First of all f6 and f7 are programmed with:

```
*KEY6 SAVE SAFETY|M*D
R.1|M*DIR $|M*EXEC CHECK
|M
  *KEY7 SAVE C_LIST|M*D
R.1|M*DIR $|M*EXEC ADDW|
M
```

So the file to be checked is always called SAFETY and CHECK is the name of the *ViewSpell* boot file. The first boot file, which can be entered using *View*, or the *BUILD command should contain:

```
*SPELL
MODE 0
USER GENERAL
PREFIX T :0.
PREFIX M :1.
PREFIX U :3.
LOAD SAFETY
CHECK


SAVE U_LIST
MARK M_SAFE
*DRIVE 0
*WORD
NEW
LOAD M_SAFE
```

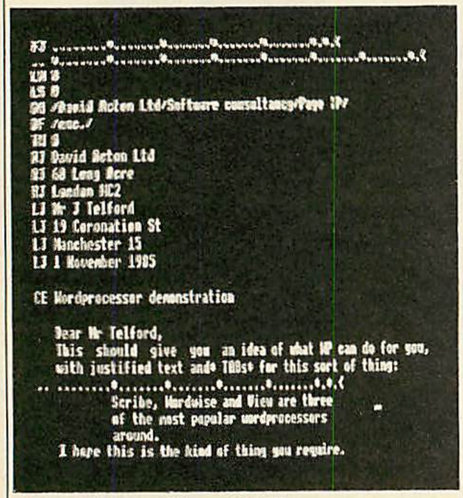
This clears any f-key definitions, enters *ViewSpell*, selects a user dictionary called

GENERAL, on Drive 3, text on Drive 0 and main dictionary on Drive 1.

The file saved with the f6 key definition is reloaded, checked (a blank line is necessary to answer the 'user dictionary?' prompt) then the unrecognised words are saved and the main text is marked at the unrecognised words. Drive 0 is reselected, *View* is entered and the marked text can be manually edited and resaved under the correct name. Then you manually load the U_LIST file into *View*, correct it, and press f7. A second EXEC file called ADDW should be created, with the following contents:

```
*SPELL
MODE 0
USER GENERAL
PREFIX T :0.
PREFIX M :1.
PREFIX U :3.
LOAD C_LIST
CHECK


ADD
```



Automating spelling with *View*

f7 saves the corrected words and starts this file, which reloads the corrected words into *ViewSpell* and presents you with each word in turn. All you need to do at each word is press Y, N or D to add, pass or delete the word from the user dictionary.

The files assume you are using DFS, and that you text is on Drive 0, your main dictionary is on Drive 1 and your user dictionary is being built on Drive 3, all in the $ directory. It is also assumed that your user dictionary is called GENERAL and that you have enough space to store all the temporary files that are created.

To use the system, create the two EXEC files and save them on Drive 1, directory $. Program the two function keys from within View (or you could prepare another EXEC file to do this). Then when you want to perform a spellcheck, press f6.

When the job is done (this could take anything up to 20 minutes) edit the marked file now in memory and save it (under a name of your own choice), and load the unique word list, and correct it. Then press f7, to go through the quick update procedure.

£5

TIPS FOR THE MASTER 512

C J Cooper of Leeds, read the item in the March edition of Hints and Tips which showed you how to make a BBC-B based 512 system recognise a realtime clock and points out that the tip as printed only works on version 1.2.

As he is using both a Master and a model B, he decided to remove the check, rather than just fooling DOS Plus about the machine type. He also decided to modify the NOTUBE.CMD file, so that this would also work on a model B. To perform this, Mr Cooper used *Edbin,* the binary editor supplied with the system. This is what to do.

Make a copy of Disc 1 (the Dos Plus System disc) using the *Disk* program, and place the copy (not write-protected) in Drive 0. Leave *Disk* and at the Dos prompt, type:

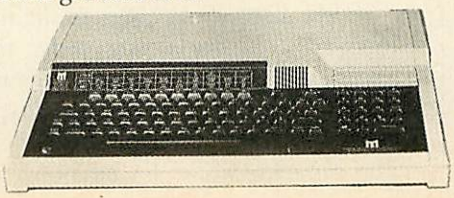
```
A>FSET *SYS [DIR RW]
A>EDBIN
-r DOSPLUS.SYS
-e 795F
```

The screen will display:

```
1817:795F 75 03 E8 03
```

Your cursor is positioned over the first byte.

Type 90, and the first byte (currently 75) will be changed to 90. Press right cursor to move onto the next byte, and type 90 again. The second byte is changed on screen. The editor is a bit unusual in that the cursor is always over the second hex digit in the byte, but you soon get used to it.



Now type CTRL-C, and you will be returned to the '-' prompt where you should type:

```
-w DOSPLUS.SYS
-r NOTUBE.CMD
-e 227
```

Again the display (address 1817:0227) starts with 75 03 and these changed to 90 90 followed by CTRL-C and:

```
-w NOTUBE.CMD
```

What has happened here is that an 80186 instruction JNZ 03 has been replaced with two NOP bytes. The changes for DOS Plus 1.2 or 1.2+ (the Solidisk PC Plus version) are the same for NOTUBE.CMD but the alteration of DOSPLUS.SYS is only one byte, 7487 from 74 to EB. Don't forget to type:

```
-w DOSPLUS.SYS
```

to write the altered file back to disc. What this is doing is changing JZ 01 C3 to JMP 01 C#, removing the check on the host type.

After you have made these modifications, type q at the *Edbin* prompt to return to DOS. Incidentally, typing h at the *Edbin* prompt will list all the *Edbin* commands.

When you have finished making the alterations, the system files on the new disc should be restored with

```
A>FSET *.SYS [SYS RO]
```

and this disc should be used in future for booting up. It will recognise any realtime clock system which uses Osword 15 to read the clock. If you don't have a realtime clock fitted, spurious dates and times appear. To avoid this, create an AUTOEXEC.BAT file on the boot disc with Date and Time commands.

£5

ALTERATIONS TO ADFS WIPE

Andrew Fowler from Guildford has written to point out a couple of bugs in the ADFS Wipe program in the December 1988 edition of Hints and Tips. The following lines should be altered:

```
320 B%!9=B%!9-1
590 IF G=89 THEN PROC
oscli("DELETE "+A$):VDU
89:B%=!9=B%!9-1:del%=del
%+1 ELSE VDU 78
```

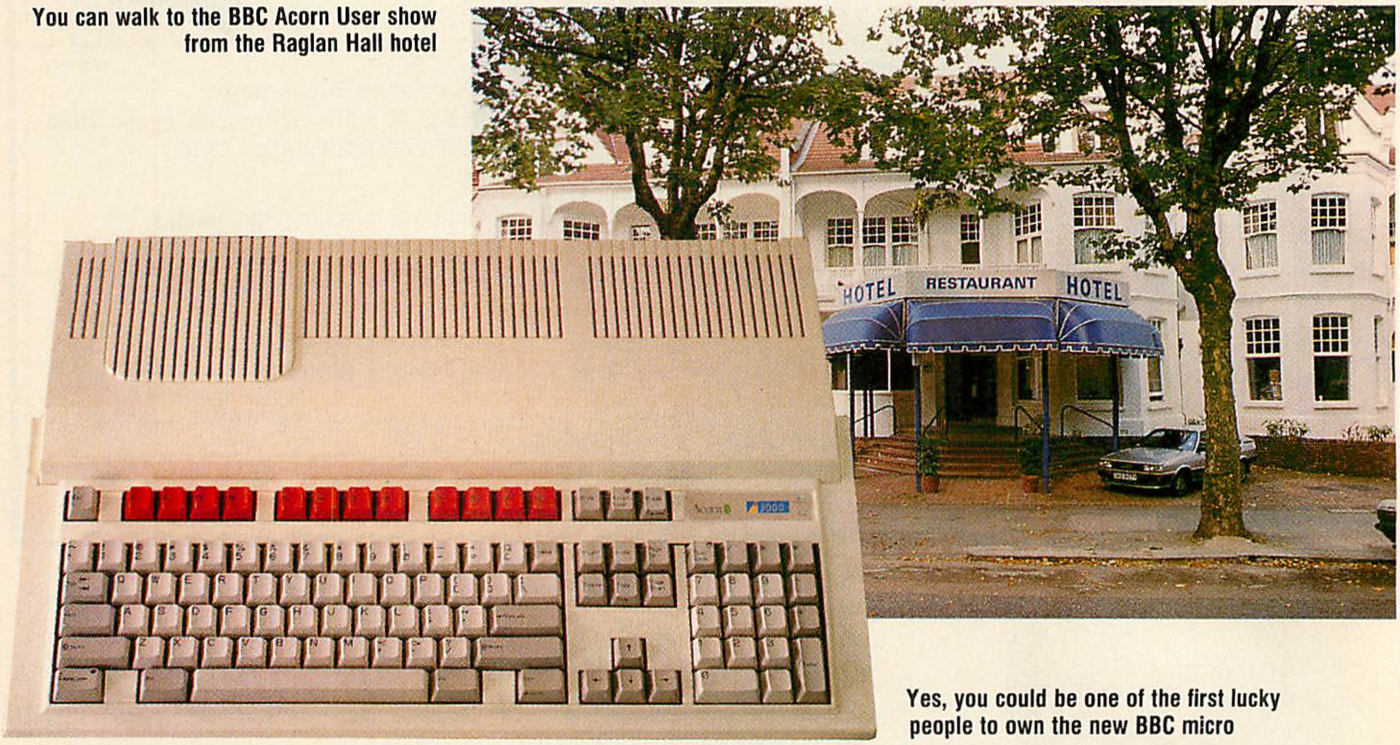
This cures an error I made which prevents the program from correctly dealing with ten-character filenames.

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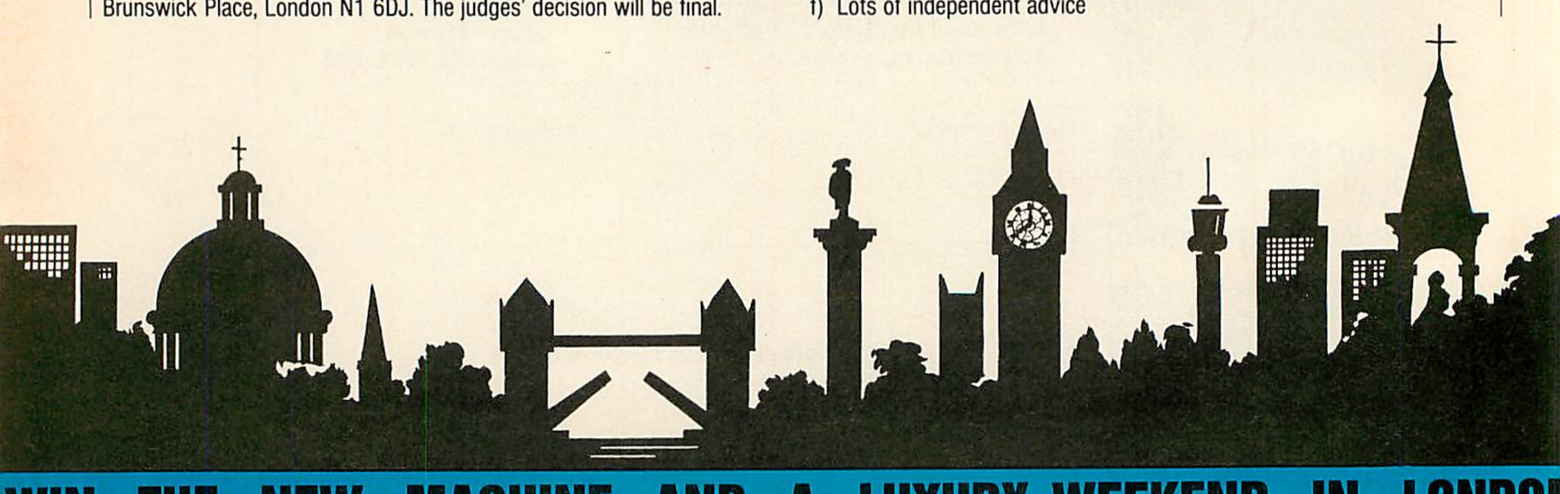
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2) When was the first BBC micro launched?
3) What was Acorn's home computer prior to the models A and B?
4) How many model A and Bs were made? 650,000 800,000 or 500,000
5) When was the first issue of *Acorn User* published?
6) Who was the first editor of *Acorn User*?

Place the following features in order of importance:

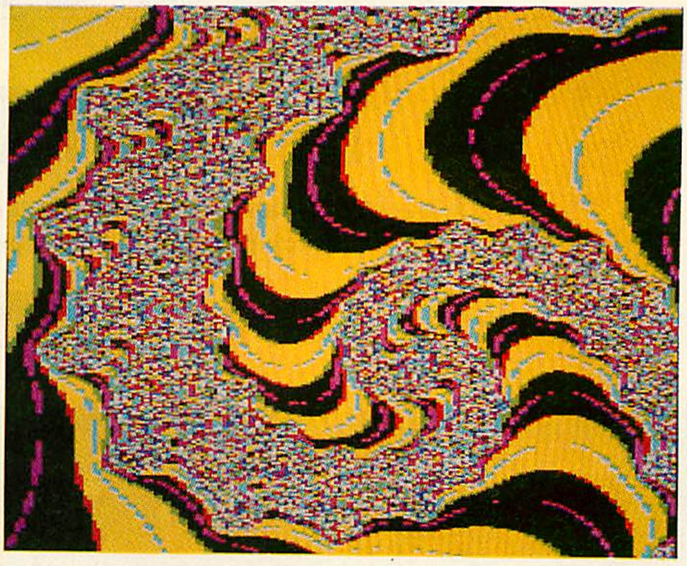
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ARC AGORA

THE JOY OF STICKS

A joystick emulator to overcome your conversion problems, short cuts into directories and saving paper with multi-column printing

David Acton



Our joystick emulator behaves impeccably under the Arc's 6502 emulator

Our first offering this month should appeal to readers for two reasons. It overcomes the problems of converting joystick-controlled Beeb software to work on Archimedes machines, and it's a jolly good example of writing modules, intercepting service-calls and generally messing about under Arthur's bonnet (or that of Risc OS which I hope you'll all be getting real soon now . . .).

The program is a joystick emulator and comes from Agora regular, Richard Averill of Surrey. £20 worth of listing 1 can be found, as ever, on the good old yellow pages. They're not just there for the nasty things in life like a blocked drain . . .

Listing 1 assembles a module and saves it as JSEmulator which can be loaded with a simple *JSEmulator or *RMLoad JSEmulator. The module may be used to emulate Beeb joysticks using the Arc mouse. In total, five new star commands are provided.

The JoystickInfo command tells you what joystick emulation is currently in use. *JoystickAnalogue causes the mouse to emulate an analogue type joystick. *JoystickDigital emulates the digital type. *JoystickSpeed sets the sensitivity of the emulation and is followed by a parameter in the range 1 (slow) to 9 (fast). Finally, *JoystickOff disables any emulation.

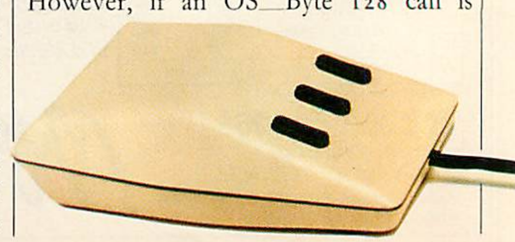
On the Beeb and Master, joystick positions are read using the Basic function ADVAL which in turn uses OS_Byte call 128. This call normally produces the error 'Bad command' on the Arc (unless an Acorn I/O Podule is fitted). Richard's module intercepts this OS_Byte call when emulating a joystick and returns appropriate values according to the mouse position. There are five ADC (analogue to digital conversion) channels of note: ADVAL (0) returns the state of the joystick fire button, ADVAL(1), ADVAL(3) returns joystick x positions and ADVAL(2), ADVAL(4) returns joystick y positions.

For compatability, values are returned as 16-bit numbers with the low-byte in R1 (like the Beeb's X register) and the high-byte in R2 (the Beeb's Y register). Basic's ADVAL function expects the data to be split into two parts like this.

To illustrate the emulator, run listing 2 on the yellow pages. The cross-hair illustrates the joystick position. The left mouse button can be used to draw lines and the right button switches between digital and analogue emulations.

All relocatable modules are given a 'private' word which most use as a pointer to their own block of workspace. Richard's module needs to remember only the type of emulation selected and this is stored in the private word. No emulation is signified by 0, 1 means digital emulation and 2 means analogue emulation.

When the module is loaded, the initialisation code at .ptrinit is called. This prints a message and sets the emulation to analogue. The main work is done by .ptrservice which waits for the 'Unknown OS_Byte' call. If this service call is made (if ADVAL is used in a Basic program) then the OS_Byte number is checked. In fact there are several OS_Byte calls pertaining to ADVAL. The first part of .ptrservice ensures the correct X and Y parameters are returned. However, if an OS_Byte 128 call is



MAIN PHOTOGRAPH BY MIKE BOTHA

detected, the mouse buffer is flushed, OS_Mouse is called to find the current status of the mouse and then, depending on which ADC channel is being read, control is passed to a routine from the table .tbljump.

These routines perform the necessary bit-shuffling to ensure that a plausible result is safely returned. The command table for the module is fairly standard, and the code for each of the star commands supported should be fairly self-evident.

Richard has assured me that the emulator works well with programs such as Beebugsoft's *Paintbox* and behaves impeccably under the Arc's 6502 emulator, which can't be bad.

£5

ECONOMIC MACROS

This quickie is a boon to tired fingers and keys alike and should appeal in particular to hard disc owners with wild and rambling directory trees. Richard Walker, suggests using macros as a short cut into often-used directories.

First, set up two macros by typing the following:

```
*SETMACRO Alias$? CAT
     |<Dir$%0>
*SETMACRO Alias$D DIR
     |<Dir$%0>
```

This effectively defines two new star commands. To make use of them simply provide an abbreviated name for your much-frequented directory.

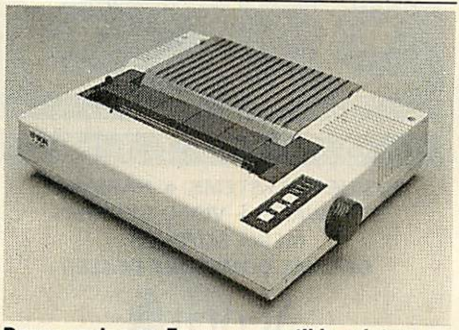
For example, if your Basic programs are stored in a directory called :4.$.Progs.Basic you could abbreviate this to 'Bas' by typing:

```
*SET Dir$Bas
:4.$.Progs.Basic
```

Now, typing *? Bas will catalogue your Basic directory and the command *D Bas will take you into that directory. (Note that Richard originally used *> rather than *D but when typing this on my machine, Risc OS complained.)

The program actually works because the tail of your command (which is Bas in this case) is passed to the Macro (as %0) and it is then appended to Dir$. This is then converted to the full pathname and the *Dir or *Cat is performed as required. I think it's all rather neat really, don't you?

THE GREEN PAGES?



Paper saving on Epson-compatible printers

Well, what with all this sudden interest in matters ecological, I thought I'd better do my bit for the struggle to conserve the forests. I therefore present a multi-column printer utility – MultiPrint – for your entertainment.

Your listings may henceforth be distributed tastefully across a few pages rather than squeezed into a thin dribble down the left-hand side of what was once several acres of virgin Scottish woodland.

This also has the added advantage of making your programs easier to follow.

Listing 3 on the yellow pages assembles and saves two utilities, MPlist and MPblist (MP for MultiPrint of course).

I think *MPblist is probably the most obscurely named star command ever, but that's not important right now.

There is only one difference between the two utilities. *MPblist prints out a spooled Ascii file and 'balances' the column lengths of the final (partially filled) sheet. *MPlist simply fills up the columns from left-to-right.

If you have a hard disc I suggest you put a copy of MPlist and MPblist in $.Library. Once they are ready to use, you may print out a Basic listing by loading the Basic program. Now spool a listing of the program to a temporary file, for example:

```
LISTO 1
*SPOOL temp
LIST
*SPOOL
```

Now type *MPlist temp. Your listing will be printed out in condensed type with three columns to a page. The utilities are designed to work on Epson-compatible printers only.

MPlist and MPblist are assembled by PROCass which takes two parameters which are, first, the utility name and second a True/False flag which is used to make the small adjustment necessary to balance the columns.

The overall approach is quite simple. A buffer the size of a printed page is established and cleared with spaces. Then, text is read in from the specified file (using OS_BGet) and is fed into the buffer byte by byte until either the buffer is full or the text is at an end. In either case, the buffer is then printed out.

In fact, the buffer can be thought of as a long, thin sheet of paper – as wide as a single column and of length c*n, where c is the number of columns specified and n is the number of printed lines per page.

If we take the number of printed lines per page to be 58 and the number of columns to be three, the buffer length will be 174 lines. The printed page is formed like this:

LINE 0	LINE 58	LINE 116
LINE 1	LINE 59	LINE 117
.	.	.
.	.	.
.	.	.
LINE 57	LINE 115	LINE 173

To achieve 'balanced' columns, the total number of printed lines is divided by the number of columns and this is used as the 'step' across the page. If the page is full, the format will be as shown above. If only half-full, the 'step' size would be 29 rather than 58:

LINE 0	LINE 29	LINE 58
LINE 1	LINE 30	LINE 59

and so on . . .

The number of spaces between columns is fixed in the listings at three. You might like to play around with the variables at the start of listing 3 in order to alter the page length, number of columns and so on.

The buffer itself is stored at the end of the code. In fact, the required number of bytes (of junk) are saved with the code to ensure there is enough workspace when running the utilities.

Essentially, a variety of presets are available to allow spooled files printed across two to five columns and in several styles of print.

Additionally, individual variables (such as page length, number of columns etc) may be specified individually.

Send your programs, ideas, hints and tips to: Arc *Agora,* BBC Acorn User, *Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. There's a reward of up to £20, plus the honour of having your name dangled between Agora's hallowed sheets . . .*

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Arc software on Page 4

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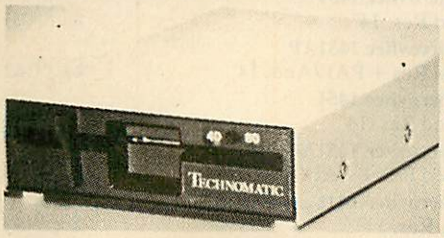
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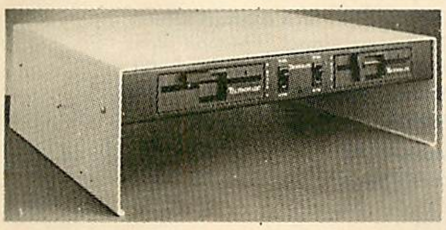
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40 3.5″ 80T DS Discs in lockable box **£38(b)**

FLOPPICLENE DRIVE HEAD CLEANING KIT
5.25″ Kit with 20 disposable discs **£14.00(d)**
3.5″ Kit with 20 disposable discs **£14.75(d)**

DISC STORAGE BOXES
DB340 Lockable 40 × 3.5″ **£6(c)**
DB380 Lockable 80 × 3.5″ **£7(b)**
DB550 Lockable 50 × 5.25″ **£6(c)**
DB100 Lockable 100 × 5.25″ **£7(b)**

EPROMS/RAMS

2764-25	£2.80	27256-25	£6
27128-25 (12.5vVpp)	£4.50	27128-25 (21vVpp)	£6
27512-25	£9	6264LP-15	£6

These prices subject to change (Carriage code d)

All prices ex VAT and subject to change without notice. See page 6 for Carriage Charges.

TECHNOMATIC

Techno House 468 Church Lane, London NW9 8TQ. Tel: 01-205 9558 Fax: 01-205 0190

PRINTERS

EPSON

LX800	£165(a)	**LQ500**	£265(a)
FX800	£295(a)	**LQ850**	£415(a)
FX1050	£349(a)	**LQ1050**	£569(a)
EX800	£399(a)	**LQ2550+**	£919(a)
EX1000	£530(a)		

GQ3500 Laser Printer £1249(a)

TAXAN KP815 £155(a) TAXAN KP915 £275(a)

Star LC10 £215(a)
Star LC10 Colour £225(a)
Star LC24-10 £275(a)

NATIONAL PANASONIC
KXP1081 includes Master Lead £139(a)
HP Laserjet Series II £1329(a)
Brother HR20 Daisy Wheel £349(a)
HP Deskjet £599(a)
Integrex Colour Inkjet £529(a)

PLOTTERS

Hitachi 672XD A3 4 Colour HPGL **£479(a)**
Plotmate A4S **£379(a)**
Plotmate A3M **£549(a)**
Roland 880 A3 Flat bed 8 col **£525(a)**
Variety of Plotter pens and accessories in stock.
Larger Plotters available. Please enquire.

PRINTER ACCESSORIES

SERIAL INTERFACES

Epson 8143	£32(d)	Epson 8148 (8K buffer)	£79(d)
Nat Pan KXP17	£39(d)	Taxan	£49(d)

RIBBONS
LX80/86/800, MX/RX/FX80/85/800/850 £4(d)
MX/RX/FX100, FX105/1000/1050 £6(d)
LQ500/800/850 £5(d)
LQ1000/1050, EX800/1000 (Black) £8(d)
EX800/1000 £16(d)
LQ2550, JX80 £13(d)
StarLC10/NL10, NatPan KXP1081 £4(d)
LC10 Colour £6.50(d)
Taxan 810/815/910/915 £5.75(d)
Integrex Black Cartridge £8(d)
Integrex Colour Cartridge £14(d)
Juki 6100 £1.80(d) Brother HR15/20 £4(d)
HI80 Pens (4) (Aqueous or Oil Based) £6.90(d)
Hitachi Pens (6) Aqueous £18.50(d) Oil £25(d)
Colour option EX800/1000 £35(d)

CUT-SHEET FEEDERS

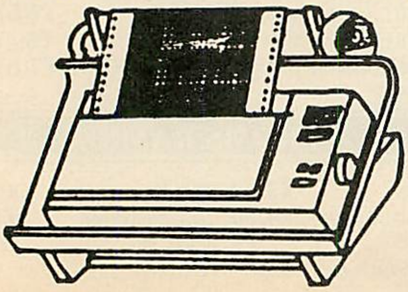
LX800	£70(b)	LQ500	£75(b)
FX/LQ/800/850	£135(b)	FX/LQ1000/1050	£179(a)
EX800	£150(b)	EX1000/LQ2500	£210(a)
Star LC10	£55(b)	Brother HR20	£229(a)

TRACTOR FEEDS

LQ800	£44(b)	LQ1000	£55(b)
LQ850	£70(b)	LQ1050	£85(b)

PRINTER STAND

A new style printer stand with easy paper feed and paper seperation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. **£26 (b)**



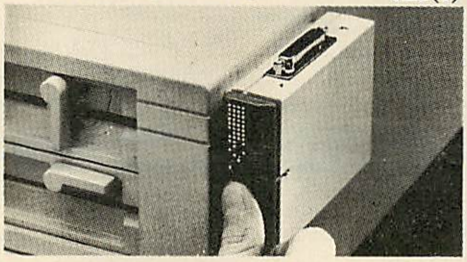
PRINTER BUFFERS SHARER & CONVERTERS

TSB 256 Auto Sharer/Buffer
256K buffer with 3 input ports. Each port scanned automatically every 10 secs until data found. PAUSE, COPY and RESET Facitilies. Full spec on request. £169(a)

Smart Printer Buffers
Facilities include: COPY upto 265 copies PAUSE, RESET, Self-Test.
For serial: X-on/X-off, ETX/ACK or DTR/DTS protocols independently selectable baud rate for each port
PP256 256K Parallel buffer £169(b)
SS256 256K Serial buffer £189(b)

Parallel Multi-Spoolers
Allows connecting 2 printers to 2 or 4 computers
Butter allows quick dumping of data to free the computers
COPY allows upto 999 copies, SELF-TEST, PAUSE, CLEAR
MS422 4computers/2printers 512K buffer £299(b)
MS223 2computers/2 printers 512K butter £199(b)

Compact Two Way Switch 2 computers to 1 printer or 2 printers to 1 computer Attaches to the side of a computer or a printer **£23(c)**



Compact economical Converters
C-PS Parallel/Serial converter £35(c)
C-SP Serial/Parallel converter £35(c)
Add £30 to above prices for units with 64K buffer
Buffered units support X-on/X-off, ETX/ACK, DTR/DSR protocols.

Manual Printer Sharers:

(All lines are switched).	Parallel	Serial
2 computers to one printer	£23(c)	£23(c)
3 computers to one printer	£30(c)	£30(c)
4 computers to one printer	£36(c)	£36(c)
2 computers to 1 or 2 printers	£49(c)	£49(c)

Cable sets for above sharers available for all popular computers

BBC Computer Sharer: TCS26
1 computer to 2 printers fitted with BBC cable £15(c)

Paper & Labels
Plain fanfold paper with microperforation:
2000 sheets 9½ × 11″ £12(£3.50)
2000 sheets 14½ × 11″ £18.50(£4.50)
1000 Sheets A4 90gsm £12(b)
1,000 sheets A4 80gsm £12(b)

Labels/1000
Single Row 3½″ × 1⁷⁄₁₆″ (d) Triple Row 2⁷⁄₁₆″ × ⁷⁄₁₆″ £5(d)
OHP Transparencies A4 (100) £56(b)

PARALLEL PRINTER LEADS

BBC/Master (1.2m)	£5(d)	BBC/Master (2m)	£7(d)
Archimedes (2m)	£7(d)	Compact (1.2m)	£7(fd)

MONITORS

12″, 14″ and 20″ MONITORS

Microvitec 1431
Std Res, 14″ **£175(a)**
Microvitec 1431AP
Std Res + PAL/Aud, 14″ ***£199(a)***
Microvitec 1451
Med Res, 14″ **£219(a)**
Microvitec 1451AP
Med Res + PAL/Aud, 14″ **£255(a)**
Microvitec 1441
Hi Res, 14″ **£359(a)**
Dust Cover for Microvitec 14″ monitors **£5.50(d)**

Philips 8833 14″ RGB
Med Res, 14″, high contract screen, TTL/Linear input, Mono/Colour Switch Stereo Sound Input. Separate controls for brilliance and contrast. **£219(a)**

Touchtec 501 **£239(a)**
Acorn Philips
14″ Colour Monitor **£199(a)**
Microvitec 2030CS
20″ Standard Resolution RGB/Comp Video **£380(a)**
Microvitec 2040CS
20″ High Resolution RGB/Comp Video **£675(a)**
TAXAN SUPER VISION 625
12″ Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible. **£269(a)**
TAXAN 770+
MultiSysnc Autoscan 14″, ideal for utilising the hi res modes on Archimedes. Our price includes a tilt & swivel stand **£449 (a)**
NEC MultiSync II 14″
Enhanced version of the original NEC MultiSync. complete with tilt & swivel base. Suitable for Archimedes and PC compatibles. **£459(a)**
MTS 9600 MultiSync 14″
Fully compatible Archimedes/PC Compatible systems complete with tilt and swivel stand **£399(a)**

MONOCHROME MONITORS

PHILIPS 7502
Hi Res green screen **£72(a)**
PHILIPS BM 7522
Hi Res amber screen **£79(a)**
Tilt & Swivel Stand for Philips Mono **£6(c)**

MONITOR ACCESSORIES

Microvitec Swivel Base (14″ plastic monitors) **£10(c)**
Monitor Stand Models B & B+ **£10(c)**
Monitor Stand Master **£13(c)**
Double Tier Stand Models B, B+ or Master **£24(b)**
Taxan RGB Lead **£7(d)**
Microvitec Lead **£4(d)**
Monochrome BNC/Phono Lead **£4(d)**
Copy Holder Self Supporting A4 **£15(c)**
General purpose tilt and swivel stand for 12″ and 14″ Monitors **£12(b)**

MODEMS & SOFTWARE

MIRACOM WS4000 V21/V23	**£115(b)**	Termulator (B/B+)	**£25(d)**
MIRACOM WS3000 V22	**£275(b)**	Termulator (M)	**£35(d)**
MIRACOM WS3000 V22bis	**£395(b)**	MAYA (B/B+/M/Arc)	**£49(d)**
PACE LINNET V21/23	**£129(b)**	Commstar II (B/B+/M)	**£28(d)**

All modems carry a BABT Approval

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Techno House 468 Church Lane, London NW9 8TQ. Tel: 01-205 9558 Fax: 01-205 0190

Archimedes SOFTWARE

LANGUAGES & PROG. TOOLS

ANSI C/ISO PASCAL/ FORTRAN 77 each £95(c)
PROLOG X/LISP each £175(b)
TWIN Editor £27(d)
Archimedes Assembler £185(b)
Software Dev. Toolbox £185(b)
RISC BASIC Compiler (SV) £85(c)
Clares Toolkit £32(d) Clares Toolkit+ £41(d)

WORD PROCESSORS

First Word Plus £79(c) GraphicsWriter £27(d)
Pipedream £89(c)
Pipedream Spellchecker £43(d)

SPREADSHEETS

Logistix £95(c) Sigmasheet £59(c)

ACCOUNTING SYSTEM

Minerva's Suite each £54(d)
(Order Processing/Sales Ledger/Stock Manager/ Purch. Ledger/Nom. Ledger)

EMULATED PACKAGES

VIEW/Viewsheet/Viewstore each £47(d)
Interword/Intersheet each £35(d)
Wordwise £20(d)

GRAPHICS/ART/CAD

ProArtisan £145(b) Artisan £30(d)
Artisan Support Disc £17(d)
Auto Sketch £69(d)
GammaPlot £30(d)
System Gamma+ £59(d)
Presenter £24(d) SVARC-PCB £167(b)
SVSolidCAD £41(d) SVSuperDump £20(d)
SV Real Time Solids Modeller £75(c)

GAMES

Hoverbod/Missile Control each £13(d)
Orion/Freddie's Folly each £13(d)
Zarch £15(d) Conqueror £24(d)
Enthar Seven £29(d) Minotaur £9(d)
Clares 3 Game Pack £12(d)

DATABASES

Deltabase £26(d)
System Delta Plus £59(d)
Prog Ref Guide £26(d)
AlphaBase £39(d)

MISCELLANEOUS

PC Emulator £79(d)
HEARSAY Comms Package £55(d)
MAYA Terminal Emulator £49(d)
Control (setup utility) £13(d)

BBC FIRM/SOFTWARE

INTEGRATED PACKAGES

MEGA 3 ROM £76(c)
MINI OFFICE II
Disc for Model B & B+ £14(d)
Disc for Master £16(d)
Disc for Compact £19(d)
ROM Version (B, B+, M&C) £43(c)
(For disc version pse specify 40 or 80T)

UTILITIES

Acorn ADFS ROM £26(d)
Acorn GXR GRAPHICS ROM £20(d)
(please specify B or B+)
PRINTMASTER £24(d)
DUMPMASTER £26(d)
SCREEN PRINT £25(d)

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE £36(d)
STARdataBASE £29(d)
ACORN OVERVIEW (Specify if Compact) £65(b)
INTERBASE £49(d)

DRAWING PACKAGES

NOVACAD (B, B+, M)
NOVACAD TM Version £39(d)
NOVACAD + Plotter DG £49(d)
Plotter Driver Generator £12(d)
*Techno*CAD (M) £99(c)

MARCONI RB2 TRACKER BALL
with ICON MASTER (B, B+ Master) £59(c)
with CURSON CONTROL ROM (M) £59(c)
Stand Alone £45(c)
(Specify if AMX compatible version)
Cursor Control ROM (M) £10(d)
SV Solids CAD £41(d)

WORD PROCESSORS

Acorn View Professional £50(c)
VIEW 2.1 £35(d) VIEW 3.0 £45(c)
Double VIEW (ROM) £20(d)
Double VIEW (Disc) £15(d)
View Printer Driver Generator £8(d)
WORDWISE £24(d)
WORDWISE PLUS £38(d)
INTERWORD £36(d)
EDWORD II £39(c)
WYSIWYG Plus £15(d)
SPELLMASTER £42(d)
SPELLCHECK III £25(d)

LANGUAGES

META ASSEMBLER £90(b)
META DISASSEMBLER £90(b)
ACORNSOFT C £29(d)
ACORN MICROPROLOG £50(d)
ISO PASCAL £51(c)
ISO PASCAL SAG £30(d)
OXFORD PASCAL (for B or B+) £32(d)
(pse specify 40 or 80 Track)
OXFORD PASCAL for Master £49(d)
LOGOTRON LOGO £49(c)
Advanced BASIC Disc £12(d)
(for B, B+ or Master with 2nd Proc)

COMMUNICATIONS

TERMULATOR (BBC B or B+) £25(d)
TERMULATOR (Master) £35(d)
MAYA TERMINAL EMULATOR £49(d)
COMMSTAR II £28(d)

SPREADSHEETS

VIEWSHEET £36(d)
WINDOMATIC (A VIEWSHEET UTILITY) £15(d)
INTERSHEET £37(d)
INTERCHART (A GRAPHICS UTILITY) £25(d)

BBC PUBLICATIONS EDUCATIONAL SOFTWARE

PRIMARY EDUCATION

Astronomy £8(d)
Computers At Work Aud/Disc £16(c)
Picture Craft £17(d)
Introducing Geography £15(d)
The Hall of Mirrors £13(d)
Geordie Racer £12(d)
Bird Spy £8(d)
Maths Aud/Disc £12(d)

SECONDARY LEARNING

Technology & Design Pt 1 £21.50(c)
Electric Fields £8(d)
'A' Level Statistics £19(d)
'A' Level Geography £13(d)
Inside Information Prog/Cass £10(d)
Book £8(d) Aud £5(d)
Open Learning Pack D/Aud/Bk £36(b)
Science Topic (ST): WAVES £7(d)
ST: RELATIONSHIPS £7(d)
ST: BONDING £7(d)
ST: ElecMag. Spectrum £7(d)
ST: Electronic in Action £7(d)
ST: Newton & The Shuttle £9(d)
ST: ECOLOGY £9(d)
ST: POLYMERS £9(d)
ST: Classif. & Periodic Tab £10(d)
ST: Food & Population £10(d)
Sec Science (SS) Microtech £7(d)
SS: Mole Concept Disc/Aud £10(d)

GENERAL

Vu-Type £7.50(d)
Vu-Type Professional £19(d)
White Knight Mk II £16(d)
(pse specify Compact or 1770DFS)
Battlefields Cass £5(d)
Espana Viva Disc £19(d)
Book £6.95(d) Disc/Aud (2) £7(d)
Black Queen (1770DFS) £13(d)
Bismark (1770DFS) £13(d)

Codes: **Cass:** Program on Cassette. **Aud:** Audio Cassette. **Disc or no Code:** Program on disc
Above Programs are suitable for BBC B, B+ & Master

All software in this advertisement has been tested to work with appropriate Acorn Disc Filing Systems only and we are unable to comment on compatibility with any other filing system. It will be the buyers responsibility to verify such compatibility.

TIME WARP for Models B & B+

Upgrade your model B or B+ computer to provide real time and date information at any time. Time Warp with battery back up fitted as standard simply plugs into the User Port. Demo Software on Disc includes a diary/planner application. £29(d)

SPARE PARTS

BBC B/B+		MASTER 128	
Power Supply	£52(b)	Power Supply	£65(b)
Keyboard	£52(b)	Keyboard	£65(b)
Keyboard Connector	£5(d)	Keyboard Connector	£3.75(d)
Video ULA	£18(d)	CF30060 ULA	£10(d)
Serial ULA	£14(d)	CF30047 ULA	£15.25(d)
Keyswitch (B/B+/M) (pse specify original type)			£1.75(d)
ARCHIMEDES			
Keyboard Assy	£85(b)	Mouse	£45(c)
Power Supply	£65(b)	Keyboard Curly Cable	£22(c)
Drive Cable	£5(d)	41464 RAM IC	£8.50(d)

We carry a full range of parts in stock.

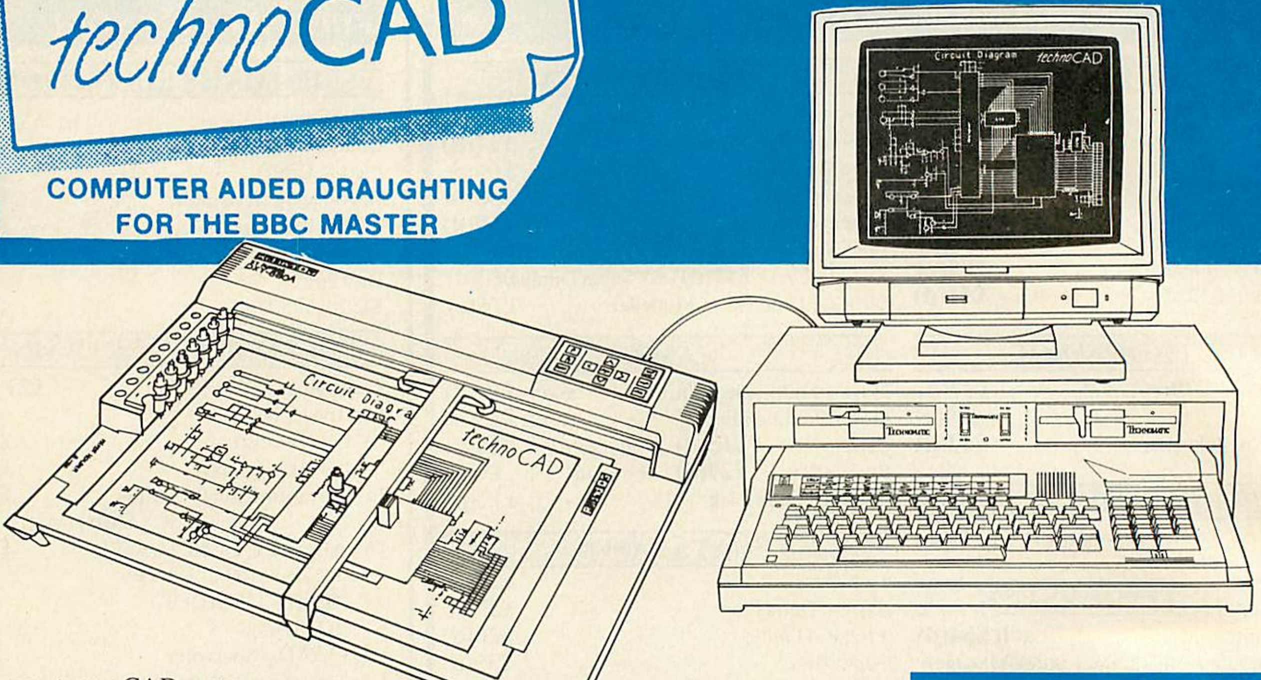
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TECHNOMATIC

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technoCAD

COMPUTER AIDED DRAUGHTING FOR THE BBC MASTER



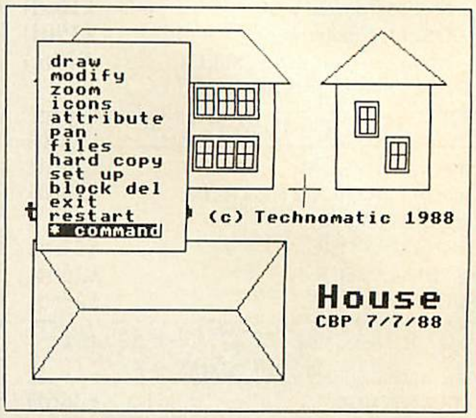
- ★ An easy to use CAD system with pop up menus providing a user friendly interface at all stages of operation.
- ★ Input can be configured for keyboard, mouse or tracker ball. Only three keys to input all commands if input from keyboard.
- ★ Virtually no limit to the size or complexity of the drawing that can be created. Powerful zoom facility allows a A0 size drawing to be viewed from single screen or a single screen can be enlarged to A0 size. Continuous panning across a drawing by specifying co-ordinates.
- ★ Lines, arcs and circles can be drawn with ease and in user defined colour and thickness. These can be modified at any stage of drawing.
- ★ User definable grid and scale, together with on screen display of dimensions, and co-ordinates enable easy and accurate drawings.
- ★ Multi layering capability with 8 levels allows superimposition of drawings.
- ★ Powerful icon utility allows any shape or drawing to be saved to a library as an icon. Icons can be recalled from the library and placed anywhere on the screen drawing at required scale and orientation.
- ★ Toolkit program allows customisation of files, utilities and peripherals.
- ★ Drawings can be scaled on screen to suit the plotter or printer in use. A maximum resolution of 0.01mm is available. Pre-configured drivers for many popular plotters and a driver generator for any BBC compatible plotter is included. Printer drivers for Epson 9 pin and 24 pin printers are included as standard as is the facility for installing drivers for other printers. Printers will output in landscape or portrait format.

FREE EVALUATION DISC AVAILABLE
Phone for your copy
£99(c)

Why technoCAD

The best feature of technoCAD is not its outstanding performance, not its unique ability to allow creation of complex icons, not the quality of output from printers or plotters. The best feature is the unprecedented ease with which it can be mastered. With easy to use single key commands limited to three keys, pull down menus and a clear and concise, easy to read manual, technoCAD is truly the system any one can use.

technoCAD will meet the needs of most professional applications and is an ideal tool for teaching CAD in technical schools, CDT departments and colleges.



BOOKS

No VAT Carriage Code (c)

LANGUAGES

6502 Assy Lang Prog	£10
6502 Programming	£8
8086 Book	£23.95
Acorn FORTH	£8
Acorn LISP	£8
Acorn ISO Pascal Ref Manual	£8
BASIC ROM User Guide	£9.95
30Hr BASIC	£7.50
Intro to COMAL	£8
Master Reference Manual I	£14
Master Reference Manual II	£14
Micro Prolog Ref Manual	£8

BBC MICRO GUIDE BOOKS

Inside Information	£8.95
Maths Prog in BBC Basic	£5.95

ARCHIMEDES

Archimedes Reference Manual	£29.95
Arc. Assy. Lang. Prog.	£14.95
Inside Autosketch	£12

PROGRAMMING/UTILITY

Advanced Sideways Ram User Guide	£8
Advanced User Guide (BBC)	£15.95
New Advanced User Guide	£19.95
Assy. Lang. Prog. BBC	£10.50
Mastering Assembly Code	£6.00
Mastering Interpreters & Compilers	£10.00
Master Operating System	£6.95
Mastering View, Viewsheet & Viewstore	£8.00
View by B. Smith Dabhand	£8.00
View 3.0 Manual	£8.00
Viewstore Manual	£8.00
Viewsheet User Guide	£8.00
Wordwise Plus	£5.00
Understanding Interword	£5.00

SOUND & GRAPHICS

Computer Graphics & CAD Fundamentals	£5.00
Mastering Music	£5.00

DISC DRIVE SYSTEMS

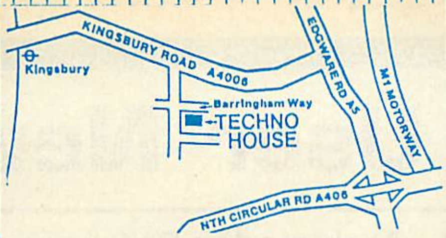
Advanced Disc User Guide	£15.00
Disc Programming Techniques	£7.00
File Handling on the BBC	£7.00
Practical Disc File Techniques	£4.00
Mastering the Disc Drive	£5.00
Mastering DOS plus	£9.00

APPLICATIONS

The Software Business	£2.50

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MAIL ORDER & RETAIL
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London NW9 8TQ.
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Fax: 01-205 0190



For fast delivery telephone your order on 01-205 9558 using VISA/Access Card

Orders welcome from government depts & educational establishments

All prices ex VAT
Prices are subject to change without notice
Please add carriage
(a) £8.00 (Courier)
(b) £2.50
(c) £1.50
(d) £1.00

PC COMPATIBLE BOOKS

Using SMART	£21.45
Using Symphony 2nd Ed	£24.95
Advanced Techniques dBASE III+	£21.95
dBASE III+ Handbook 2nd Ed	£20.95
dBASE III+ Progrmg Tips & Techniques	£16.95
Mastering dBASE III+	£19.95
Understanding dBASE III Plus	£20.95
123 Tips Tricks & Traps	£19.95
ABC's of 123	£16.95
Mastering 123 (2nd Ed.)	£19.95
Using 123 Special Edition	£21.95
Mastering Supercalc 4	£19.95
Advanced Techniques Wordperfect	£18.95
Using Wordperfect W/Book & Disc	£27.45
Wordperfect Tips Tricks Traps	£16.95
ABC's of Word Perfect 5	£16.95
Mastering Wordperfect 5	£19.95
Using Wordperfect 5	£22.95
Introduction to Wordstar	£17.95
Wordstar Prompt	£9.95
Introduction to Wordstar 2000	£16.95
Wordstar Prof Complete Reference	£24.95
ABC's of Autocad	£20.95
Inside Autocad	£27.95
Inside Autosketch IBM	£12.00
Mastering Ventura	£21.95
Publishing Power with Ventura	£22.95
Ventura Tips and Tricks	£18.95
Advance C Techniques and Applications	£19.95
Advanced C Programming	£19.10
C At A Glance	£8.95
C Programming Lang 2nd Ed	£24.95
C The Complete Reference	£21.95
Solutions in C	£17.25
Turbo C Complete Reference	£24.95
Using Turbo C	£19.95
Advanced Turbo Prolog	£19.95
Introduction to Turbo Prolog	£19.95
Advanced MS DOS (Microsoft)	£19.95
DOS Instant Reference	£9.95
DOS The Complete Reference	£21.95
Mastering DOS Vers to 3.3	£19.95
MS DOS Encyclopedia to 3.2	£95.00
MS DOS Handbook (3rd Ed.)	£18.95
MS DOS Quick Reference (3.2)	£8.95
PC Magazine DOS Power Tools	£39.95
DOS Plus Reference Guide	£12.95
Understanding Unix 2nd Ed	£19.45
UNIX Programming Environment	£21.70
Unix The Complete Reference	£22.95
Programmer's Guide to Windows	£23.95
Using Sidekick Plus	£21.95

Professional Software Developers Tools for BBC Universal Development System

A set of three packages to meet the needs of any software developer for assembling, disassembling and emulating codes for over 30 processors. Packages are structured to work with new processors.

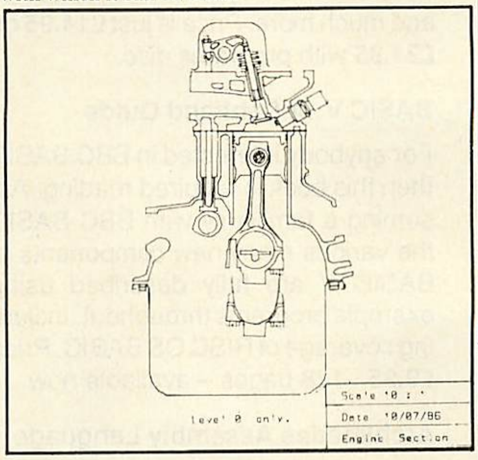
Full details on request. This is what Acorn User had to say about the assembler.

"All the good features you would expect to find in a good source code editor are present ... Meta assembler lives in a different world. It is structured to work with any new processor ... as new instruction sets can be added ... as needed ... has a well featured editor with colour highlighting, a sound modular approach." Acorn User October 1986

NOVACAD Computer Aided Draughting System

Novacad can drive a plotter to produce drawings of highest quality... Novacad is excellent. It is flexible, genuinely easy to operate without much practice, and a pleasure to use. Beebug Dec 86

A sophisticated CAD package with unique facilities. Thousands of Novacad packages are being used in widely differing fields ranging from industries for producing engineering drawings to accountants offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing high quality output are making extensive use of Novacad's unique features. Novacad is proving to be an invaluable teaching aid in technical schools simply because of the ease with which it can be used.



Novacad is compatible with all models fitted with Acorn DFS. Hardware requirements can be minimum; single drive and FX80 compatible printer are enough to get started, though its performance is enhanced considerably by use of 6502 2nd processor, dual drive and to a degree with B+ and Master's shadow ram.

The major features offered are:

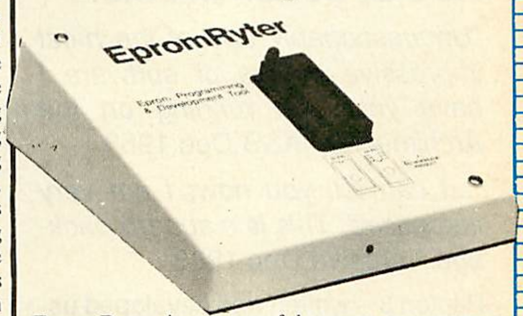
- ★ Simple and easy to use with logical command sequence.
- ★ A large drawing area (approx 15 screens)
- ★ Unique ability to create complex icons made up of upto 500 lines instead of the usual 15 to 20 pixels, store them in a library and recall them at different scales and orientations.
- ★ Zoom facility.
- ★ Create multi level drawings.
- ★ Text entry at any 90° orientation anywhere on the screen.
- ★ Grid scaling and locking, displacement measurements.
- ★ Printer routine for FX80/100 compatible printers
- ★ Cursor control from keyboard/tracker ball/mouse.

Plotter driver generator available as an optional utility, configures a routine for any BBC coompatible plotter. Pre configured routines for popular plotters like Epson HI80, Hitachi, Plotmate are included. Drawings can be scaled to maximumm plotter size.

NOVACAD T/M Version	£49(d)
NOVACAD T/M + Plotter DG	£61(c)
Plotter Driver Generator	£15(d)

EpromRyter

***Highly sophisticated & Advanced Programmer**
***All current single rail eproms handled**
***State of the Art Programming Algorithms**



EpromRyter is a powerful eprom programmer designed for use with the BBC Master Computer. It takes full advantage of the latest developments in the eprom technology and the extra facilities on the Master to provide fast, simple and efficient programming and editing facilities.

The software is totally menu driven and on screen help messages make the programming simple for both specialists and novices alike.

The EPROMRYTER interfaces with the Master through 1MHz bus. It is mains powered with its own psu. 3M Textool zif socket has been fitted to ensure consistent and reliable service over long periods.

The single rail eproms handled by the EpromRyter are:
- 2716 2732 2764 27128 27256 27512 27513 27011 2516 2532 2564 (NMOS & CMOS)
- One time eproms P27XXX, 87CXXX etc.
- Also A suffix eproms such as 27XXXA

£89(b) + VAT

EPROMER II

A proven Eprom programmer for BBC Model B and B+ with thousands in use in industry, educational and R&D establishments. It offers many of the powerful features of the EpromRyter and can program all single rail eproms upto 27256. Full details on request. **£89(b)**

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Now supplied with the New RISC OS

System	Basic	Mono	Colour	Multiscan
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410	£1199	£1259	1398	£1619
420	£1699	£1759	£1898	£2119
440	£2529	£2589	£2728	£2948

(Securicor carr. £10 on Archimedes)

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Buy an Archimedes micro from us at above prices and we will conbtribute 10% of the money you spend, towards the purchase of a printer, disc drive or any Hardware or Software of your choice.

ACCESSORIES

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- ROM Podule (Computer Concepts) £45
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- Backplane FAN only (for Hard Disc) £9
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By popular demand, we are now supplying refurbished and fully guaranteed BBC Micros with Disc Filing System
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** Requires System Delta*

Archimedes to BBC SERIAL LINK

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers. Using this package it is possible to transfer any data from the BBC to Archimedes at upto 19200 baud.

Only £15

Archimedes 5¼"/3½" Disc drive Interface

With this interface it is possible to connect almost any 5¼"/3½" disc drive with its own power supply to the Archimedes. NO SOLDERING is involved. Supplied complete with necessary lead.

Only £21

Note: This is not simply a lead. Attempting to connect an external disc drive by direct connection may result in damage to your Micro.

Watford's 20Meg & 40Meg Archimedes Hard Disc

Watford Electronics' 20Meg & 40Meg hard disc fits internally into the Winchester slot provided. It is fully compatible with Acorn's hard disc upgrade, (the only difference is our low price). Price includes the Hard Disc Drive, Controller Podule & fitting instructions.
P.S. This upgrade requires a backplane and a fan.

Arch HD20 – 20Meg Hard Drive	£379
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Backplane for 4 Podules	£38
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Archimedes Assembler	£189
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MASTER 128K Micro incl. Acorn's: View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus £35 worth of FREE OFFER (see below) **£439**

FREE . . . £50 worth of Software

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control, and the popular, Master Advanced Reference Manual. With every BBC Master purchased from us this month.

BBC Master with Turbo Board + above SPECIAL OFFER £549

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System 3	System 1 + Medium Res Colour Monitor	£469
RS232 Kit for BBC Compact		£25
Additional 3½" Drive for BBC Compact		£90

(Securicor carriage £10)

65C102 2nd PROCESSOR

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B. This is a complete package, with its own power supply, ready to interface with your BBC Micro.

£159

CO-PRO Adaptor



With this Watford's Co-pro Adaptor unit, you can now attach any BBC Master's coprocessors to your original BBC B.
Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.
With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.
To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.
Master owners may use Co-Pro Adaptor to add a second Co-processor externally.
Watford, brings power to your BBC at only:

£35 (carr £5)

REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£15 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £15
BBC B Micro only

Versatile **BEEB SPEECH SYNTHESISER** Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
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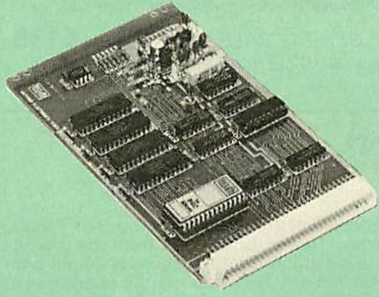
NEW

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.
It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price	**£5.95** (No VAT)
Example programs on Disc	**£4.95**

Archimedes Real-Time Digitiser



Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air television signals may also be digitised via a video recorder or TV tuner.

Once captured, Video images can be stretched, squahsed, rotated, stored on disk, printed, or used by applications software.

Applications include desktop publishing, graphics, animation, image analysis and recognition, medical imaging, automatic inspection and measurement, databases, interactive video, remote transmission of pictures via a modem, movement detection ... or anything else you can think of!

SOFTWARE
All driver software for the digitiser is contained in a ROM on the podule. Software facilities are accessed via operating system star (*) commands and SWI calls. A Utility Disk is included containing sample pictures, examples and Utility programs.

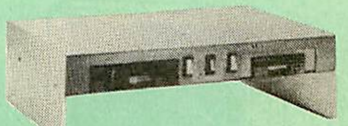
RESOLUTION
Images are digitised to 512 (h) x 256 (v) pixels, and then scaled to fit the Archimedes' screen. It is possible to digitise to 512 x 512 pixels if the picture is stationary for about 0.1 second. 512 x 512 images can either be displayed on a MultiSync monitor, or on a normal monitor using interlacing.
Pictures are digitised to 64 levels of grey (6 bits). Note, however, that it is only possible to display all 64 levels on a monochrome monitor, or a colour monitor which has a composite (CVBS) input. For this reason, the Philips CM8533 monitor is recommended instead of the standard Archimedes monitor. It is also possible to connect both a colour and a monochrome monitor at the same time.
Any 2,16 or 256 colour graphics mode can be used to display digitised pictures. In two colour modes, grey levels are represented using dot patterns, which may be redefined if required (a pattern editor is supplied).

SPEED
Video fields are captured in real time (1/50th sec.), and then transferred to Archimedes' memory or the screen. The grab/display rate is dependant on the screen mode and picture size, up to 25 fields per second for quarter screen images, or 12.5 per second for fullscreen (Mode 9).

HARDWARE
The digitiser is a single width podule, with a BNC socket on the rear panel for the video input, which may optionally be terminated via a link. There is 128K of on-board memory to store the digitised image, and a 32K ROM on the podule contains all the driver software.

Price £249

Disc Drives DP35-800S



A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.
To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.
The 5.25" disc drive is 40/80 track switchable. For ease of access, the switches are front mounted. DP35-800S has its own power supply, independent of the BBC Micro.
Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

Launch Offer: **£165** (carr. £7)

Z88 Sinclair's Portable Micro



The worlds first, truly portable Micro. It is A4 size, only an inch thick and weighs under 2lbs. Ideal for use when travelling or as a personal organiser.

Only: **£199**

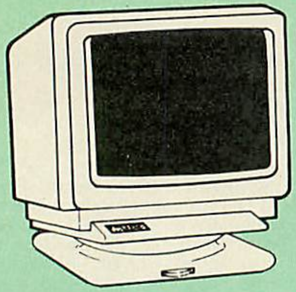
FREE
With every Z88 purchased from us this month, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

ACCESSORIES

Mains Adaptor		£8.65
32K RAM Pack or 32K EPROM Pack		£17.35
128K RAM Pack or 128K EPROM Pack		£43.40
512K RAM Pack		£169
Z88 Spellmaster for Pipedream		£51
Z88 to BBC Link	£22	
Z88 to PC Link II	£30	
Z88 to Macintosh	£49	
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Continued →

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- 1451AP RGB + PAL and AUDIO £255
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- **Touchtec 501 Touch Screen** **£239**

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- **EIZO** 8060H – For technical info. read the review in Micro User, Jan. '89 £439
- **EIZO** 9060S .28 resolution £458

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- Super Vision 3 – **Type 625** Super Hi-res RGB Colour, Green/Colour Switch £315

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PHILLIPS

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STAR BUY

- **PHILLIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £199

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SPARE LEADS

BNC Lead for Zenith or Philips	£3
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RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

SWIVEL BASES

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the monitor viewing angle.

for 12" Monitors **£8** (carr. £2.50)

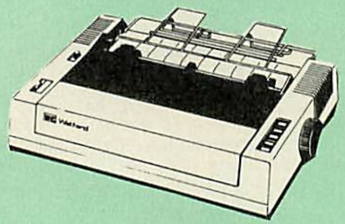
for 14" Monitors **£12** (carr. £2.50)

TAXAN KP-815 PRINTER

Offer Price £155

Taxan KP915 132 Column	**£275**
RS232 Interface	£49
RS232 Interface with 2K Buffer	£69
RS232 Interface with 16K Buffer	£89

Panasonic KX-P1081



UK's most popular printer.

(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

SPRING SALE OFFER only: **£139**

Optional RS232 Interface: £39

NEW

Panasonic KX-P1124

Watford Electronics, your authorised Panasonic Premier Dealer, brings you from the prodigious Panasonic Stables, this fabulous 24-pin printer.

Available NOW at a superbly realistic price, KX-P1124 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

At less than 53dB, this is perhaps the quietest dot matrix printer on the market.

Watford's Launch Offer: **£269**

Panasonic Printers

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- **KX-P1592** 9pin 136col. 216/45 CPS £275
- **KX-P1595** 9pin 136col. 288/61 CPS £355
- **Panasonic KX-P4450** LASER PRINTER Latest technology at Watford's special offer price £1,499
- Spare Toner £29
- A4 Feeder £55

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175;	KX-P1540 (P35)	£185
KX-P1124 (P36)	£88;	KX-P1180 (P37)	£79

BUFFERS

P12 4K Buffer Board for 1081	£55
P42 32K Buffer Chip for 1592/1595	£49
P43 32K Buffer Chip for 1540	£49

Serial Interfaces

P17 P1081/1592 £32 P19 P1124/1180 £55

PLOTTERS

- Plotmate A4S £379
- Plotmate A3M £549

Roland Plotters

DXY 880A	£560	DXY 1100	£630
DXY 1200	£879	DXY 1300	£1035

INTEGREX COLOUR JET

- Colour Jet 132 Printer £515
- Paper Roll £6.50
- Screen Dump Software £10
- Colour Cartridge £14
- Black Cartridge £8
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123

NEW – Intergrex COLOURCEL NPQ Ink Jet Colour Printer £2,695

NEC P2200 PINWRITER

24 pin; 80 column; 168CPS – 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc.

£269

Pinwriter Serial Interface (optional)	£55
P2200 Cut Sheet Feeder	£59
Additional Font Cartridge	£25
NEC P2200 Pinwriter Ribbon	£6

NEC PINWRITER P6/P7 Plus

NEC P6+ 80 columns	£439	NEC P7+ 136 columns	£575
Colour Option	£74	Serial Interface	£73
Cut Sheet Feeder	£125		

Star Printers

Star LC10	£169	LC10 Colour	£215
Star LC24-10	£279	NB24-10	£449
LC10 Colour Ribbon	£6	Cut Sheet Feeder	£65

Brother HR20 DaisyWheel Printer **£339**

EPSON PRINTERS

EX800	£405	LQ850	£430
EX1000	£564	LQ1050	£570
FX850	£315	LQ2550	£925
FX1000	£425	LQ2500+	£839
FX1050	£439	LX800	£169
LQ500	£275	SQ2500	£975
GQ3500 Laser	£1150		

CUT SHEET FEEDERS for

EX800 **£149**; EX1000/LQ2550 **£210**; FX800 **£149**; FX1000 **£179**; LQ/LX800 **£139**; LQ500 **£75**; LQ850 **£135**; LQ1050 **£175**.

TRACTOR FEED for

EX800/1000 **£85**; LQ800 **£44**; LQ850 **£69**; LQ1050 **£85**; LQ2500 **£195**

ACCESSORIES

- EX800/1000 Colour Option £55
- EX800/1000 Colour Ribbon £18
- LQ2500 Colour Option £65

(Securicor Carriage on Printers £7

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£40	RS232 + 8K Buffer	£79

PRINTER LEADS

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 1 meter	£6
Nimbus Centronics Lead	£12
IBM Parallel Lead 1 meter	£6
Double Ended 36 way Centronic Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.

RS-232 GENDER CHANGERS

Male to Female	£4.95
Male to Male	£4.95
Female to Female	£4.95
25 way Male to 9 way Female	£4.90

Listing Paper (Perforated)

● 1,000 Sheets 9½" × 11" Fanfold Paper	£7
● 2,000 Sheets 9½" × 11" Fanfold Paper	£12
● 1000 Sheets 9½" x 11" NCR 2 Part Fanfold	£19
● 1,000 Sheets 15" × 11" Fanfold Paper	£9
● 1000 Sheets true A4 Fanfold Paper 70gms	£11
● 2000 Sheets true A4 Fanfold Paper 70gms	£19
● Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

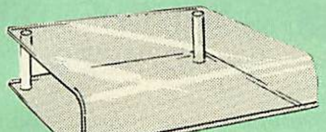
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 × 36mm (Single Row)	£5.00
1,000 90 × 36mm (Twin Row)	£4.90
1,000 90 × 49mm (Twin Row)	£7.50
1,000 102 × 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand. The printer sits on top and the fanfold paper rests neatly underneath, thus occupying the same space as the printer footprint.

Only: £16 (carr. £3)

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

***80 Column version £23** (carr. £3)*
***132 Column version £26** (carr. £3)*

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
Brother HR15/20	£3.00	–
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
IBM PCs pair	–	£6.00
RX/FX80/MX80	£3.00	
DMP2000	£3.75	£4.75
EX/LQ800	£4.50	£4.50
EX/LQ1000	£7.50	£5.00
RX/FX80/85/800/MX80	£3.90	–
RX/FX100/1000	£5.75	–
Kaga/Taxan KP810/815	£4.90	£4.00
LC10 (Black)	£4.25	£5.00
LQ500/800	£3.75	£5.00
LQ1050/LQ2500	£8.50	£5.50
LX80/86/800	£3.80	£4.50
M1009/GLP	£3.80	£3.75
Panasonic KX1080/81	£4.00	£4.75
SQ2500	£23.00	£5.50
Star NL10	£3.75	£4.50
Olivetti Ink Jet Cartridges (set of 4)	£9	

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Universal Printer Sharers/Changers

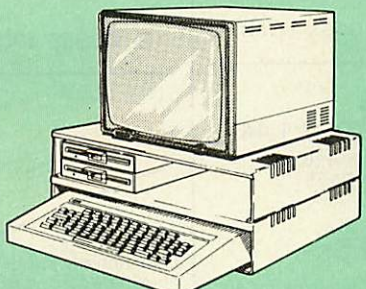
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spagetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments.)

Connects	Serial	Centronics
2 to 1	£20	£22
3 to 1	£27	£30
5 to 1	£36	£39

(Cables extra at £6 each. Please specify type required when ordering)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



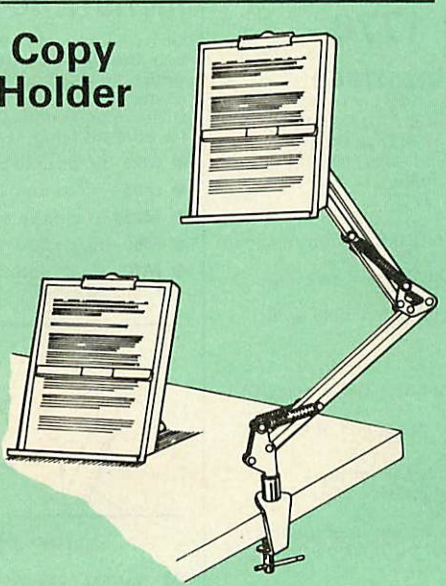
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	420 x 310 x 105mm **£12**
Double BBC Plinth	420 x 310 x 210mm **£20**
Printer Plinth	420 x 310 x 105mm **£12**
Single Master Plinth	490 x 310 x 105mm **£13**
Double Master Plinth	490 x 310 x 210mm **£24**

(Carr. Single plinth 12; double plinth £3)

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

NEW

Handy 2 Way Printer Switch

A handy two way compact printer switch that enables you to connect 2 Micros to 1 printer, or 2 printers to 1 Micro. Attaches easily to your printer, monitor, etc. A low cost solution for educational establishments. Ideal for those wishing to use a dot matrix and a laser printer. Available in two configurations.

Compact AB Switch Centronics	**£20**
Compact AB Switch RS232	**£19**

(Cables extra at £6 each)

MEGABUFFER 256



The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

Only £149 (carr £5)

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

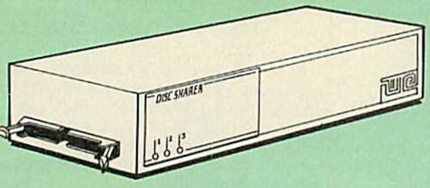
It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Continued →

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£65** Price includes 3 Cables

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

WATFORD's & ACORN's DFSs

Watford's popular and widely acclaimed DFS has now been available for six years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn standard DFS). (while Acorn's 1770 DFS is fully compatible with Watford's Mk II DDFS)***

- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**
- *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**

(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).

(The Single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

NEW

Watford's MkII 1770

Double Density DFS Interface

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features:

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00.**

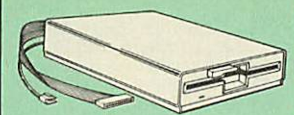
- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
  - We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

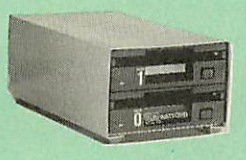
Special 40/80 Disc Drive/DDFS Mk II Offer



- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both, Single & Double Density modes.
- A comprehensive User Friendly Manual.

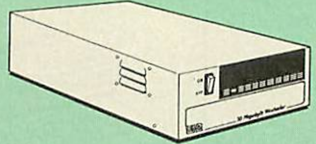
A Bargain at Only **£123** (£7 carr) (Offer valid while stocks last)

3½" DISC DRIVE OFFER



These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

- **CLS35 400K Unit £69** ● **CLD35 800K Unit £125**



WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBc B (with 17 X disc interface).

- 30 Megabyte BBC Hard Disc **£405** (carr £9)

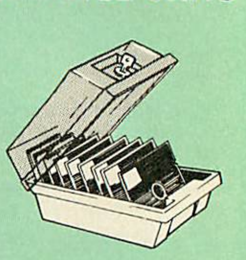
FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

£4

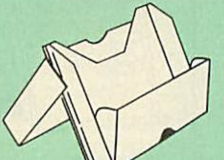
ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



- **M35** - holds upto 50 5¼" discs **£4.95**
- **M85** – holds upto 95 5¼" discs **£6.95**
- **M25*** – holds upto 25 3½" Discs **£4.95**
- **M50** – holds 50 3½" Discs **£6.50**
- **M10** – holds upto 10 Data Cartridges **£15**

* Not lockable



PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

DISC PLONKER RACK

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds upto eight 5¼" discs.



Protection at Only: **£2**

DISC ALBUMS

Attractively finished in black leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

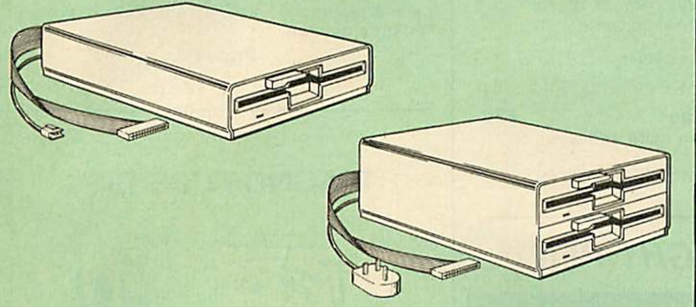
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £10. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 4th page of our advert for the Plinths).

P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415



"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £79	CLD 400 £168	CS 400S £89	CD400 £188
800K (1.44M)		CLD 800S £159		CD 800S £169

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £5 to £6

Prefix C = Cased Drive
L = Less PSU
S = Single
D = Double

Suffix S = 40-80 Switchable

e.g. *CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.*

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

Mysteries of Disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

- *10 × 5.25" S/S D/D 40 Track Diskettes (744)* ***£6.00***
- *10 × 5.25" D/S D/D 40 Track Diskettes (745)* ***£7.00***
- *10 × 5.25" S/S D/D 80 Track Diskettes (746)* ***£11.50***
- *10 × 5.25" D/S D/D 80 Track Diskettes (747)* ***£11.00***
- *10 × 5.25" 1.6M D/S D/D High Density Discs for IBM XT and AT* ***£16***
- *10 × 3.5" S/S D/D 40/80 track Discs* ***£10.00***
- *10 × 3.5" D/S D/D 40/80 track Discs* ***£11.75***
- *10 × 3.5" High Density Diskettes* ***£25***

FREE Designer Watch OFFER

Purchase any 5 packs of the above 3M Diskettes from us during the months of May & June '89, and qualify for a FREE 3M's attractive Black Designer's watch.
(Offer subject to availability)

TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives, WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

- *10 × **M3** 3.5" D/S D/D 80 Track Discs* ***£10***
- *10 × **M9** 3.5" Double Side High Density* ***£25***
- *10 × **M4** 5.25" S/S D/D 40 Track Discs* ***£5***
- *10 × **M5** 5.25" D/S D/D 40 Track Discs* ***£7***
- *10 × **M7** 5.25" D/S D/D 80 Track Discs* ***£9***
- *10 × **M8** 5.25" D/S H/D Hi-Density Discs* ***£14***
- *3" Double Sided Discs* ***£2.50 each***

Special BULK OFFER on 5¼" DISCS

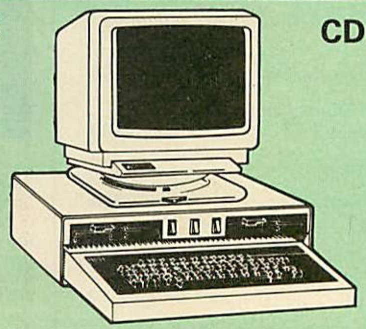
PRICES SLASHED

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48

DP35-800S **CDPM800S**

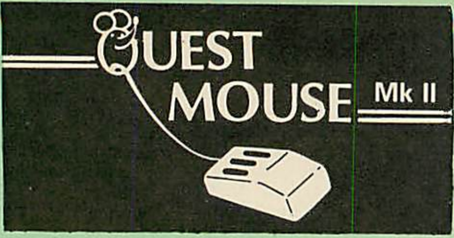


Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC & Master £182
DP35-800 for BBC/Master £165
(For DP35-800S spec. see Page 2 of our advert)
(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued →



The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

- Quest Mouse II & Quest Paint — £58
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont — £89
- Quest Mouse II only — £26
- Quest Paint Software only — £34
- Quest Font Disc — £15
- Quest Mouse Mat (Red or Blue or Green please specify) — £3
- Part Exchange your unreliable AMX Mouse for a Quest Mouse for only — £22
- GXR ROM for the BBC Micro — £22

(P.S. Quest Paint is not compatible with BBC Compact)

N.B.
1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

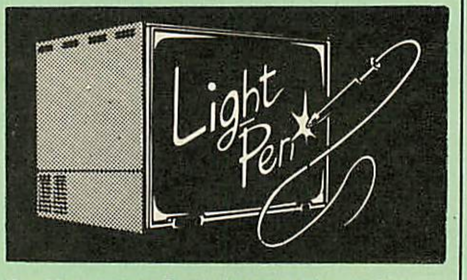
ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.
Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

ConQuest ROM Package — **£30**
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

MARK II LIGHT PEN



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.

Price Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Software Pack for Compact	£40
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75

THE NEW Mk III AMX MOUSE

ONLY: £59 **Inc. Super Art package** (carr £3)
(Please specify for BBC, Master or Compact)

MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX UTILITY Package	£13
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£15

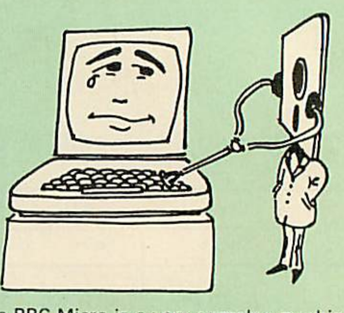
NEW

WE MOUSE HOUSE

Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, Monitor, disc drive or desk.
It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4

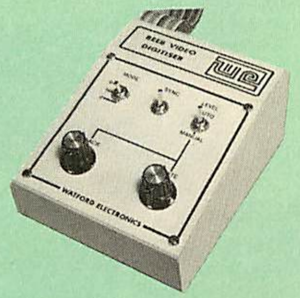
DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package i designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £5)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)

A combination of the Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Stop Press to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

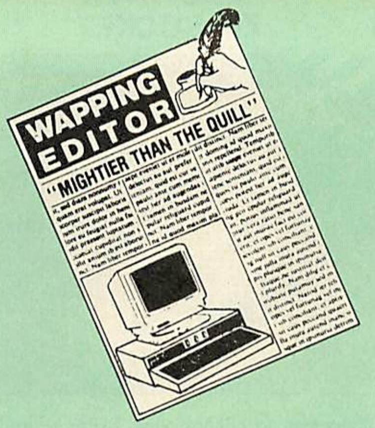
With Stop Press's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Stop Press's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out. The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)



Watford Electronics bring professional quality Desktop Publishing to the Beeb. The Wapping Editor is a totally self contained mouse-driven desktop publishing package designed to run on the BBC B, B+ and Master computers. The massive 64K Rom contains ALL the software you need to do your own publishing. It 'Brings the Freedom of Press' to your fingertip. The software has a word processor, a graphics package, a page layout section and a font designer. Although very sophisticated, Wapping Editor is simplicity itself to use. Anyone already familiar with Quest Paint will immediately feel at home.

GRAPHICS PACKAGE

Imagine Quest Paint re-written to take advantage of the high resolution of Mode 0, well this is it. The Wapping Editor could well be worth buying for this facility alone. This must surely be the graphics.

WORD PROCESSOR

This section is a fully functional word processor specially tailored to suit the Desktop Publishing environment. Gone are all the unnecessary and cumbersome text formatting commands – these are dealt with in the 'Page-Layout' section. The features of this word processor include wordwrap, wordcount, insert/overwrite, move block, copy block, delete block, search and replace, browse, etc, many of these features being mouse controlled. Text input can of course be taken from existing word processor files like Wordwise, View, etc, but it is not necessary to have a separate word processor in order to use this package.

PAGE-LAYOUT SECTION

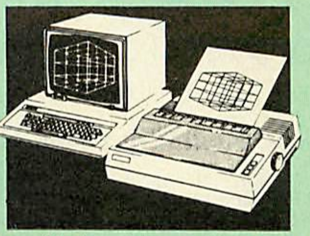
Page Layout becomes easy using these mouse-driven routines. The user simply 'pulls' a rectangle onto the page and states which text document or graphic is required to fill the space – it's as simple as that! Text can be automatically printed in a pre-set number of columns, left justified and/or right justified, or centered. Several different typefaces can be held in memory at one time. Graphics may be stretched, squashed or cropped to fit any size rectangle. Graphics input can be from the software provided in the package or, using the 'mode convert', from any graphics mode screen.

THE FONT EDITOR

This is an enhanced version of the font editor contained in the Con-Quest ROM and allows the editing of ALL 95 characters. As well as being able to design your own typefaces, fonts from other DTP packages or from Quest Pain may be loaded into the editor and converted for use with the Wapping Editor. This sophisticated editor has numerous functions including slide, flip, invert and rotate individual characters or the whole font. Individual characters can be mirrored or copied and a mask feature allows you to superimpose two characters. Lines and columns can be inserted or deleted allowing the character to be stretched or squashed. This font editor will also allow 'font' and 'brush' files to be designed for use with Quest Paint.
This package is the latest in the line of integrated professional quality mouse-driven software from Watford Electronics, the company that adds power to Beeb.

Wapping Editor — Launch Offer: **£69**
Wapping Editor with Quest Mouse — **£89**

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump

For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles.

Only: £25

OFFICE MASTER



CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and, editing features.

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

Continued

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price: Aries B-12	**£40**
Aries B-12C	**£5**

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

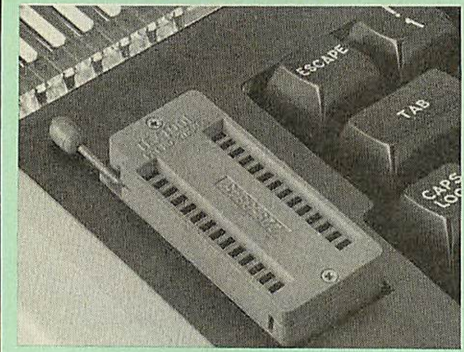
£238 (Carr £3)

EXTERNAL ROM BOARD for BBC MASTER

This external Beige finished, free standing cased unit with its own Power Supply allows you to plug-in upto 12 ROMs and 16K Sideways RAM.

Only £78

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

ROM Cartridges for the BBC Master
Twin **£8;** Quad **£12**

16K DISC RAM

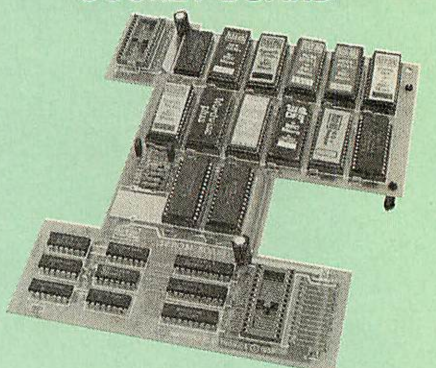
Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Compact construction.
- Supplied complete with Battery Backup.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£35** (carr £2)

P.S. 16K Disc Ram Board is not designed to work in conjunction with a Sideways ROM Board.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

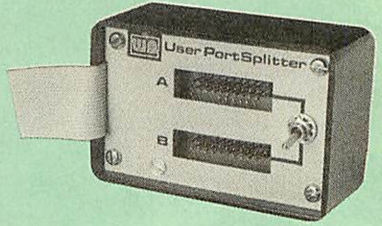
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery backup fitted **£39**
Battery Backup only **£3**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

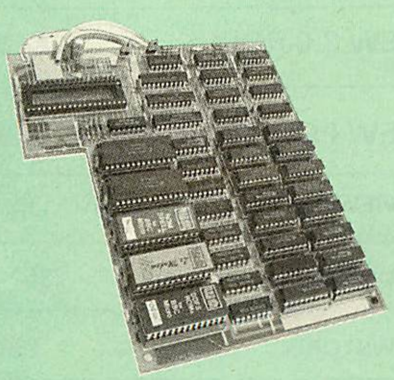
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£22** (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later:

Please write in for further details.

INTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM *£48*
- ROM/RAM card with 64k dynamic RAM *£65*
- ROM/RAM card with a massive 128k dynamic RAM £109

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit £17
- 16k Dynamic RAM for Upgrade £17.50
- Battery backup £3
- Read and Write protect switches .... £2 each

Complete ROM-RAM board
All options installed £115

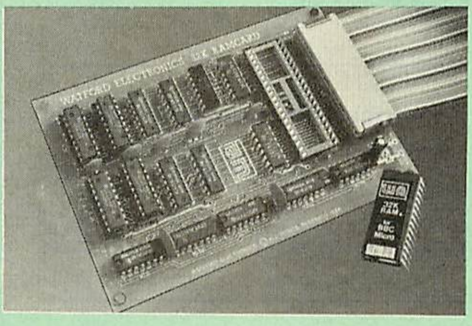
P.S.

Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

- Recommended by Computer Concepts foı use with their Inter series of ROMs.

Only £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs **£11.25**
- Maths with a Story 2 (Disc) 4 further maths programs **£11.25**
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs **£17**
- WAVES: Science Topics (Disc) CSC O Level Physics program. **£14.95**
- RELATIONSHIP: Science (Disc) O Level Biology program. **£20.00**
- BONDING: Science (Disc) O Level Chemistry program. **£20.00**
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. **£20.00**
- ELECTRONICS IN ACTION (Disc) O Level program **£19.95**
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. **£20**
- ECOLOGY (Disc) O Level program. **£20**
- POLYMERS (Disc) O Level program. **£20**
- Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20**
- FOOD & POPULATION (Disc) O Level program. **£20**
- MICROTECHNOLOGY (Cassette) O Level program. **£11.25**
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. **£21.70**
- DEUTSCH DIREKT! (Disc & Audio Cassette) **£19.95**
- Modem Master (Disc) **£11.25**
- ADVANCED TELETEXT SYSTEM **£8.65**
- PERIOD TABLE SOFTWARE **£20**
- Astronomy – Primary (Disc) **£12**
- Computers at Work – Primary **£17.35**
- Introducing Geography – Primary **£17**
- **Introducing Geography 11-17yrs** **£17.50**
- Electric Fields 6-14 years **£11.25**
- BlackQueen Contract Bridge **£13**
- Espana Viva – 3 Discs **£19.95**
- A Vous La France Disc **£21.50**

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**
- **£6.50 off annual Membership to Micronet, Prestel and Telecom Gold.**

Sale Offer: **£64** **(Carr £5)**

Price includes, the Modem, Comm Software Cables & Operating Manual). (Write in for full specification)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£30
CARETAKER Basic Utility	£23
DISC DOCTOR	£28
Graphics ROM	£29
TERMI	£25
COMMUNICATOR	£49
Printmaster	£24

Wordwise £26

Wordwise plus £40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only £24

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £42

Inter SHEET ONLY £37

INTER **CHART** ONLY: £25

Inter-WORD £36

MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM £76

INTERBASE £49

All Prices Exclusive of VAT

MINI OFFICE II

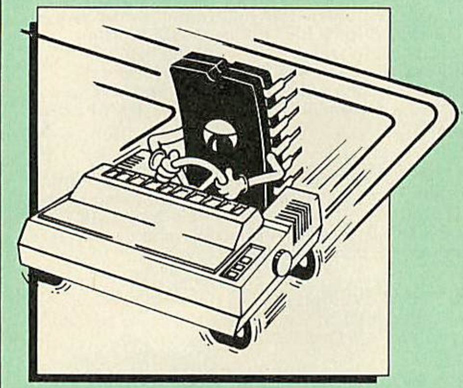
DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.50
Disc Version for the Compact	£18.00

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View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

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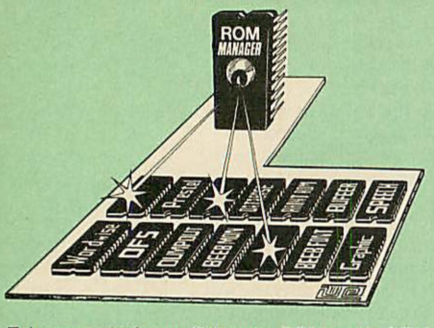
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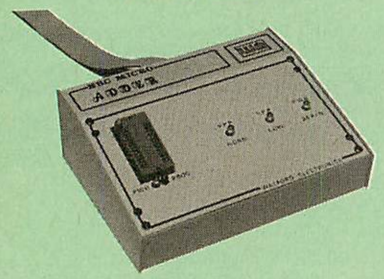
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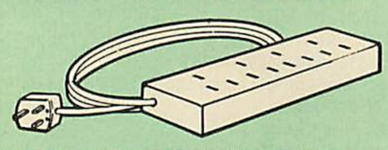
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- 8087-2 maths co-processor, optional.
- 640K minimum expandable to 1024K on system board, extra 384K RAMDISK available.
- 360K Single Floppy (optional 2nd Floppy/3.5"/20MB Winny/T. Streamer).
- CLOCK on System board, gives non stop DATE & TIME.
- 8 expansion slots.
- RS232 with two ports.
- Microsoft MS DOS 3.30.
- Mono graphics/parallel card.
- Legal BIOS and built in games port and clock.
- 102 keys keyboard.
- 150W power supply.
- GW-BASIC 3.21.

ARIES PC AT286



Specification:

- 80286 microprocessor.
- Optional 80287 Maths co-processor
- 640K RAM standard expandable on-board to 4MB.
- 1.2M Single Floppy (optional 2nd Floppy/3.5"/Winny/T. Streamer)
- CLOCK on System board, gives non stop DATE & TIME.
- 8 expansion slots.
- Serial/Parallel Card.
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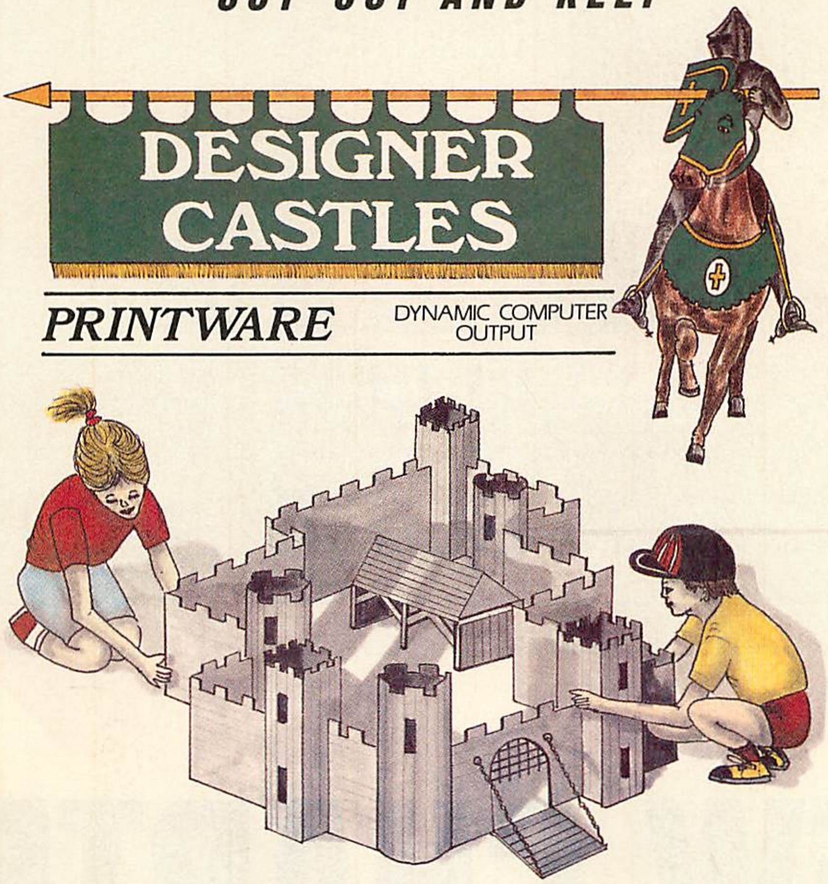
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Every so often *BBC Acorn User* finds something a little bit special, something which opens new dimensions for your micro. *Designer Castles* from Data Design is one such discovery. We are delighted to offer our readers the opportunity to be among the first with this innovative software.

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The *Designer Castles* package contains a Printware support ROM, the *Designer Castles* system disc (two discs for 40-track users), comprehensive User Guide/Manual and a hardbacked full colour binder.

Designer Castles is supplied for the BBC B/B+, Master 128 and Master Compact. It requires an Epson-compatible printer of quad density graphics. We feel that *Designer Castles* is the perfect addition to all our reader's software libraries. "It is providing a design and discovery environment, the like of which has not been seen on a BBC micro . . . , *BBC Acorn User*, March '89.

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NEW CHAPTER

Acorn has built the new A3000 to be smaller, faster, more affordable – and a real contender

Graham Bell

After six months of speculation, the truth isn't hard to guess: the latest BBC micro is an even faster and more affordable Archimedes. The new A3000 keeps all the world-beating technology of the Arcs and even improved on it. At £745 it's a third of the price of its competition – the Mac or 80386 PC. Your first chance to get your hands on an A3000 will be at the *BBC Acorn User* show in July at Alexandra Palace.

The new machine has all the power of (and is compatible with) the existing Archimedes 310. It carries an ARM Risc chip, the same memory, display and input/output controllers (MEMC, VIDC and IOC) and uses the same range of other major chips as the 310. All of these run at exactly the same speed too (8MHz) so the machine has the same 4MIPS performance as the current Archimedes. In fact, because it uses the revised MEMC1a memory management chip, it works out around 10 percent faster than the existing Arcs. This is because the new MEMC makes more efficient use of the abilitities of the memory chips.

The Risc OS operating system is held in the same 512k set of ROM chips, and the keyboard, disc drive and built-in interfaces are all completely compatible with the existing Arcs.

All this means there should be no problem with software compatibility – you can run all existing Arc packages, plus a great deal of software written for the original BBC model B. The latter running under either of the two 6502 emulators supplied with Risc OS.

What makes the A3000 different is a neat single box instead of the business-like but bulky design of the Archimedes 310. The main circuit board and power supply are hidden underneath and behind the keyboard, in much the same way as the Master or the original BBC model B, and to the right hand side, there's a built-in 3.5-inch disc drive.

The current 310 and 305 models will very soon disappear from the shops and the A3000 will become the standard 'domestic' 32-bit micro from Acorn.

The current Archimedes A440 model will also be discontinued in July but the model will be replaced by the outwardly identical 440/1 – essentially an A440 with

PHOTOGRAPH BY NICK DICKS

a 50Mb hard disc instead of the existing 20Mb unit. The 400 series is being augmented by the addition of two new models, the 410/1 and the 420/1, respectively one and two megabyte versions of the 440/1. Each is upgradeable to 440/1 specification by simply adding extra memory chips and the big disc drive.

What happens to the Master? Acorn group product manager David Bell stresses that Acorn 'will continue to both build and sell the Master 128 into the forseeable future – at least until the end of 1990'. The demand for the Master won't go away overnight and while there is a demand, Acorn will make the machines. So the four product ranges here to stay are the Master, BBC Arc 3000, Arc 440 and the Unix workstations.

The new machine in detail

The biggest difference between the A3000 and earlier Archimedes micros is that the whole machine is in a single box – so it will be neater on your desk than any previous BBC micro. The keyboard, processor and the disc drive are in a single unit slightly smaller than the Master 128 and a single mains lead powers it all.

The ARM chip in the new Arc runs at a clock speed of 8MHz, the same as the old A310 and even the R140 Unix workstation. The ARM is backed up by the three special memory, video and input/output chips. It gives the A3000 much better performance than the other micros aimed at home and education – the Atari ST, the Commodore Amiga, Research Machines Nimbus and even Apple's Macintosh SE.

These are all built around 16-bit chips, so the Archimedes deals with data in chunks twice the size. All this makes the Arc the fastest micro in its class.

The A3000 is fitted with 1Mb of random access memory (RAM) as standard. There is no half megabyte version but it's possible to upgrade the memory to a total of 2Mb of RAM by fitting extra chips inside the case on a small plug-in circuit board. There's also half a megabyte of ROM, containing the same Risc OS operating system used in the rest of the Archimedes range, and a tiny amount of CMOS static RAM to hold the configuration details. The real-time clock and static RAM are powered by a nickel-cadium rechargeable battery, which is continually 'topped up' while the micro is switched on.

What is Risc?

The heart of the BBC A3000 is the ARM processor, the 32-bit Risc chip designed by Acorn and fitted to all Archimedes micros.

A reduced instruction set computer (Risc) chip like the ARM (Acorn Risc Machine) is unlike a traditional microcomputer chip. The central processor which does all the calculation work is designed using radically different ideas. Normal processor chips are described as Cisc – complex instruction set computers. They have single instructions that do a lot, often as much as a whole line of a program in C or Pascal. Some chips are even tailored for specific programming languages.

Risc is more generalised. It's specially stripped down for speed and each instruction a programmer can use is very simple but very fast. Other chips use more complicated instructions which take longer, so a RISC chip can do several of its own simpler instructions in the same time.

The ARM is cheaper to make than Cisc and other Risc chips and uses cheap RAM so the Arc is cheaper than other computers with the same performance. The ARM chip has three siblings, MEMC, VIDC and IOC. These have been specially designed to control the memory, video and sound, and input and output functions. Together with the ARM, the necessary memory and chips to control the disc drive, they make up a complete computer.

For the full story on the ARM, read about its development in December 1988 and the technical details in the June 1987 issues of *Acorn User*.

Risc OS and the applications already available work well with 1Mb of memory but 2Mb will give you much more scope for multi-tasking – that is, having several programs in memory at once and swapping data directly between them. Similar windowed multi-tasking systems like Multi-finder on the Apple Macintosh or OS/2 on the IBM PCs often require 2 or 4Mb to run at all.

The keyboard looks identical to the rest of the Archimedes range, though it is built differently and has a quite different feel. The key layout follows the IBM PC-AT standard, with the 12 red function keys you would expect on the latest BBC micro. The usual Archimedes three-button mouse plugs in underneath the keyboard.

Permanent storage on the A3000 is handled by the 3.5-inch disc drive. This is built into the right side of the case. Risc OS allows you to read 640k ADFS discs from the Compact, the Electron or a BBC micro fitted with ADFS, or use the new Arc-only format which stores 800k of data on each disc.

Thoughtfully, the light that shows you when the drive is active is duplicated on the top of the case, so you don't have to peer awkwardly round the side to see it.

Less thoughtful is the reset switch. This is uncomfortably close to the disc eject button. It is set back into the case a little, but you could easily press the wrong one by accident.

One wonderful 'gimmick' on the new model is stereo sound. The existing Arcs have this, but only through the headphone socket. The A3000 has two speakers, one each end of the keyboard, so game sounds, music and even ordinary beeps can be in glorious living stereo.

The A3000 is the first home micro to make use of a new electronic construction technique known as 'surface mounting'. It's expensive to start with but becomes cheaper if you make huge numbers of circuit boards. Traditional resistors and capacitors are packaged in a plastic casing with wires soldered to the ends. These wires are then soldered to the circuit board. Surface mounting can almost do away with the casing and the tiny component can be put directly onto the circuit board. The whole circuit board can be manufactured as a smaller, neater and more reliable unit.

The latest IBM PS/2 PCs use this construction technique but there are very few factories in Britain which can handle surface mounting. Like earlier BBC micros, the A3000 is being built in South Wales by AB Electronics.

Expansion

Getting inside the case of an A3000 is easy. There are two springy plastic clips on the back which are secured by tiny screws and a single large screw through the middle of the underside. However, the power supply inside isn't safely cased like that in a Master, so you shouldn't do this yourself. All the internal upgrades, including extra RAM and Econet, are 'dealer only' because of this.

The A310 and A440 can take two or four expansion podules inside the case.

They can be video digitisers, extra input and output ports or even the forthcoming floating point co-processor card to speed up calculations (400-series only). With the smaller case, something has to go and only a single mini-podule can be fitted inside the new Arc.

Acorn is supplying the first board to fit – a User/MIDI mini-podule. The Master-compatible user port is vital for education, because it's widely used for devices like turtles and buggies, Concept keyboards and even 'buffer boxes' to allow you to control Lego models, lights, electric motors and so on.

Existing podules like the Watford video digitiser or the Armadillo sound samplers would have to be redesigned to fit the smaller space but the hardware changes should be simple and podule software can remain identical.

The external podule bus can take any one existing Archimedes podule, but it sticks out the back of the machine in an ungainly way like Spectrum RAM packs in years gone by. Acorn is developing a slim plastic box to protect the podule boards. The other option is to use a cable to link the podule output to a separate expansion box, but this idea hasn't been fully developed yet.

Both the internal and external podule connectors are '16-bit only'. That is, they can accept existing Arc podules but won't be able to make use of the floating-point add on. This is a 32-bit card that can only be fitted to the A400 and R140 machines. However, the floating point card is aimed at a very different market. It's likely to cost about as much as the A3000 itself.

The other routes to expansion are more familiar. Like the rest of the Acorn range, the A3000 can happily accept the standard Econet card. A simple plug-in module allows you immediate access to a network – all the necessary software is already in Risc OS.

The serial port socket is also fitted but you have to fit two optional chips in the sockets provided on the main board to make use of it. Again these are simple to plug in. The serial port is connected up in the standard way like the IBM PC-AT and the existing Archimedes so it is easy to get cables for it. There have been problems with the serial chips in current Arcs. All new machines will use the error-free version of the comms chip.

The rest of the rear panel is taken up with the parallel printer port, a hi-fi stereo sound socket that takes Walkman-type headphones and the same RGB colour and composite monochrome video connectors as the A310.

Acorn isn't offering a version of the new Arc bundled with a mono monitor but all dealers should be able to supply a suitable unit. Like the 310, the A3000 isn't capable of driving a large high-resolution mono monitor (1152 x 896 pixels). Only the 400-series micros have the extra chips to do this.

Nor can you connect any Archimedes to a domestic television but you can connect a normal mono or colour monitor, a colour multisync monitor or even an IBM VGA-type monitor. The final connector on the back is for the external podule bus.

Risc OS

Risc OS is the new operating system for all Archimedes micros. It comes standard on the A3000 and the new 400/1 range, and is available as an upgrade for existing Arc owners for about £33, although it's best to upgrade a 305 to 1Mb of memory first.

Although Risc OS itself runs on a half-megabyte machine, many of the applications designed for Risc OS don't, and you can't make real use of the multi-tasking features of Risc OS with less than a megabyte of RAM. Using Risc OS on an A310 is practical, but for more demanding applications, 2Mb of memory is preferable.

Risc OS gives you a full Wimp interface like that of the Macintosh or Microsoft Windows on IBM PCs. The programs present their data in windows on screen. Windows are moveable and you can adjust their size with the mouse. Menus and icons make it simpler to get used to a new application.

Unlike the earlier Archimedes operating system, Arthur, Risc OS also allows you to use more than one application at once and you can take data from one program to another simply by moving the icon representing the data across the screen from one window to another.

This multi-tasking and message passing is at least as sophisticated as any operating system on any other micro under £5000. You can even adjust the amount of memory allocated to each program with the mouse, or change the colours on screen while another program is running.

Within the Risc OS ROMs, there's also the latest version of BBC Basic 5, which is compatible with the Basic in the first BBC micro. So the new Arc can run most home software written for the model B or the Master 128. On the Risc OS welcome discs, there are two 6502 BBC micro emulators, one for 'Tube-compatible' programs that run on a Master Turbo and one to emulate the original BBC model B.

Also on the discs is *!Draw*, a drawing program, *!Paint*, a sprite editor and *!Edit*. This is for typing in small amounts of text, but it also allows you to 'multi-task' Basic programs.

For further details, see the description of Risc OS in the February 1989 issue of *BBC Acorn User*.

New 400 series

The Archimedes 440 is being replaced by three new machines, the new 1Mb 410/1 and 2Mb 420/1 straight away, and the 440/1 in July.

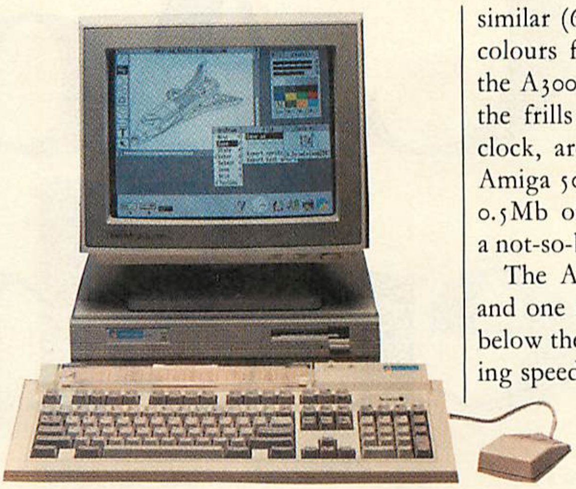
There are no outward differences between the new machines and the old 440, apart from a minor change to the fascia of the disc drive. Internally, there is a new circuit board (though it isn't surface mounted like that of the A3000) and the 420/1 has a 20Mb hard disc. A new, larger capacity hard disc will be fitted to the 440/1. This is the same 50Mb disc that is fitted to the R140 workstation. Despite the larger hard disc, the price of the 440/1 will be lower than that of the original 440.

The main circuit board has been redesigned but is fully compatible with the original Archimedes board. In addition, it offers the opportunity to expand the memory of the 1 and 2Mb models to 2 or 4Mb in total. The upgrade is simple – consists only of plugging in eight or 16 RAM chips.

Adding a hard disc to the 410/1 is also simple, as the hard disc controller chips are already fitted to the board so you don't need to fit a podule as you do with the Archimedes 310. A four-slot backplane is also standard and, as with the 440, both new models can accept 32-bit podules like the floating point co-processor when this is released.

The bottom line

The new 400-series machines are what many Acorn enthusiasts have been waiting for. The 2Mb model in particular looks to be right – particularly so if you



Risc OS allows full Wimp capability

want to make real use of your micro for desktop publishing, design, graphical work and so on.

Acorn claims that around one and a half megabytes of RAM are 'optimum', to make the best use of the multi-tasking allowed by Risc OS without paying too much for your memory chips. The ready expansion and reasonable price, when compared with machines of similar performance (like the latest PCs or the latest Apple Macintosh) make the 400-series an excellent choice.

The A3000 invites comparisons too. First to mind are Acorn's earlier 'second generation' machines, the Electron and Compact. These were both viewed as technically proficient machines but were much less successful than their predecessors. Their failure was ascribed to too high a price, lack of essential interface ports and possibly lower than expected software compatibility.

Viewed as a development of the A310, the A3000 appears to have avoided these pitfalls. Software compatibility shouldn't present any problem and all the main interfaces of the A310 are built-in or available with simple add-ons. The mono video, colour video, parallel port, sound, and serial interfaces are all there (though you have to plug in two extra serial chips) along with the ability to add the Econet network and extra 1Mb memory expansion boards.

The biggest potential problem is the lack of straightforward podule expansion. This is an important feature of the 310, as the thriving trade in backplanes proves. Most podules will have to be redesigned to fit into the smaller case and only one can be fitted. Otherwise the external podule bus must be used.

Viewed as a Master replacement for education, one has to ask where are the other interfaces – the analogue and 1MHz ports. The model B and Master set some kind of standard in education and the 1MHz bus in particular is important for the Hybrid Music 5000. Acorn has no plans for producing a mini-podule with these interfaces – only the combined user port and MIDI unit. Luckily, Pres has stepped in – see page 7.

Recent speculation has centred around the machine's value in primary education, where the price of the Archimedes has proved restrictive. The initial price of £649 plus VAT is, still too expensive, but Acorn's product manager David Bell indicated that volume educational discounts could bring the real cost down to around £500 – only a little more than education pays for a Master 128 and disc drive. The software compatibility factor is eased by the provision of the two 6502 emulators with the Risc OS welcome discs.

Specifications

	A3000	410/1	420/1	440/1
Price (ex VAT) (no monitor)	£649	£1199	£1699	£2499
RAM	1Mb	1Mb	2Mb	4Mb
Upgradeable to	2Mb	4Mb	4Mb	–
ROM	0.5Mb	0.5Mb	0.5Mb	0.5Mb
Floppy disc	800k	800k	800k	800k
Hard disc	–	option	20Mb	50Mb
Econet	option	option	option	option
Podules	1 mini int.and 1 ext.	4 slots	4 slots	4 slots
Serial i/f	option	fitted	fitted	fitted
Badged	BBC	Acorn	Acorn	Acorn
Delivery	July	Now	Now	July

All models share the 8Mhz ARM chipset, Risc OS in 512k of ROM, 3.5-inch 800k floppy disc drive, parallel, sound and video interfaces, 103-key keyboard and three-button mouse.

The home market

For the home, the major competition must be the Atari ST and Commodore Amiga games machines. These seem cheaper but the base models have only half a megabyte of RAM and use only a 16-bit processor (the 68000).

The Amiga 500 is expandable to 1Mb of RAM. In raw performance terms, the Arc should be perhaps five times faster than the Amiga, although it has less of an advantage with graphics because of the Amiga's special graphics co-processor chip. Video and sound standards are very similar (640 x 256 or 512 pixels with 16 colours from a 4096-colour palette) and the A3000 has a slight edge, but some of the frills of the A3000, like a real-time clock, are missing from the Amiga. An Amiga 500 costs £400, but with the extra 0.5Mb of memory, the total tots up to a not-so-bargain £550.

The Atari ST range covers both half and one megabyte models, at prices well below the A3000. But neither the processing speed, the graphics nor the sound are quite up to the standard of the Archimedes range: using just the 68000 chip limits the machine to perhaps a fifth of the speed of the Arc.

The biggest difference between the three machines is Risc OS itself. This is a far more developed multi-tasking Wimp system than the Amiga's Workbench operating system and is a serious rival to the Macintosh system. The MEMC chip in the Arc allows Risc OS to physically protect each program from the others that are running at the same time so if one crashes, the others can usually continue. The Amiga has no equivalent hardware protection so the system is less reliable. The ST's operating system is single-tasking only.

Looked at from the point of view of the young home games player, the A3000 still looks a tad expensive because a 512k machine is adequate. However, if you want to make more serious use of your micro, and particularly if you want multi-tasking, then you'd want to upgrade an Amiga or ST to at least 1Mb. That immediately makes the Arc a whole lot more attractive. You still pay extra but you get real 32-bit performance and the major advantages of Risc OS. A cost of £649 plus VAT looks expensive, but so did the original model B in 1982 at £399. Taking inflation over the seven years into account, and the inclusion of a disc drive, there's almost no difference in the two prices.

The BBC model B was the state of the art in 1982, and the A3000 is state of the art for 1989. The BBC B was a 'Vic20 basher' in its day and the A3000 looks capable of doing the same for the Atari ST and Amiga 500.

Once again, Acorn has produced the Rolls-Royce of home computers. It has the Arc's great graphics and processing speed, the right amount of memory, full software compatibility and only a minor worry on expansion. Full marks.

COPING WITH CHAOS

A simple accounting package for schools to handle their own resources

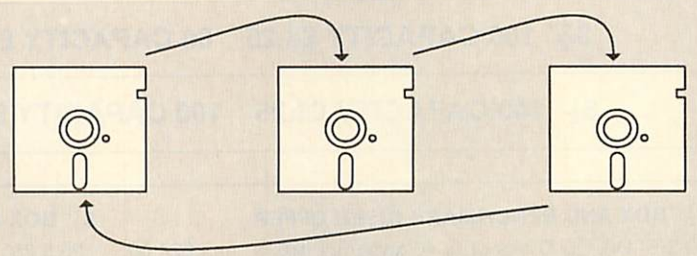
Joe Telford

'May you live in interesting times,' is a comment originally assumed to come from the Orient. I for one feel the past few years of the Acorn user revolution (well alright, Information revolution) have been extremely interesting. One of the problems, however, has been the need here at Telford Towers to regularly resurface the drive, because the post-lady has worn tracks into it with her regular visits. The Towers mail bag has been filled with 'please write-me's' recently, mainly from schools, because I am led to believe that they are in one L of a mess.

LFMS or Local Financial Management of Schools is looming large on the horizon of many schools. One or two seem to be very much involved in it, but the one message reaching the Towers is that no-one has a complete answer to the management and admin problems involved. If your local school is moving into this new type of management, where the head has responsibility for the total financial spending of the school, then the chances are that a little support from someone with a background in Acorn using would not come amiss.

To be honest, if the school has the opportunity to join with a local county scheme then that is probably the best way forward. Small micros linked to a mainframe can provide the most flexible way of sharing data between an LEA and several schools, allowing staff to work on information off-line and then log on for data transmission and powerful processing facilities. We should, however, remember that the state of most mainframe software is a great way behind that

DISC BACKUPS



Computerising a school's administration system puts a tremendous responsibility on the data storage discs. As the data is difficult or impossible to replace, it should be well protected with backups. Of course, top quality discs should also be used but even then accidents can, and eventually will, happen.

A backup is essentially just a second copy of data so that in the event of operator error or the loss or damage to a disc, a copy exists to take its place.

Of course, it is not always possible to have the very last item of data copied for security. The aim is to maintain a backup with as recent a copy as is convenient to produce.

The usual recommended technique is the 'grandfather-father-son' backup method. This involves two sets of data in addition to the current version. This may seem wasteful of discs but the media is of low value compared to the data itself.

When a backup is made, the datafiles are copied onto just one of the discs and these are then rotated next time they are to be used. In this way, at any time there is the current version of the data (the son) the most recent backup (the father) and the backup before that (the grandfather).

The current data is backed up onto the grandfather disc and this is then used for updating. The father disc becomes the oldest (grandfather) and the son becomes the most recent backup (the father).

A recent backup is then always available and should something go wrong during the backup process itself, the previous backup is always there. It will require more updating but it is a useful longstop.

In addition, this rotation of discs ensures even wear and new replacement discs should be introduced into the process regularly. For highly sensitive data, a new disc can be introduced as the son at each and every backup.

How often this backup and rotation is carried out depends on the task generating the data. If data is changing constantly then backups could be made as often as hourly. If the data is readily repeatable and it changes only sporadically then a backup each time the system is used will be sufficient.

of micro-computer software.

The most powerful tools are the standard packages, wordprocessor, DTP pack, database and spreadsheet, although I guess presentation packages will become more important as the expectations of parents and governors rise.

Unfortunately, packs like spreadsheets are often too flexible for some people to pick up easily. If the sheet is not pre-prepared with formulae and text, ready for numbers, or the operator doesn't follow the processes carefully then the chances are that errors will occur which could go unrecognised until some bill is unpaid, or apparently overpriced.

The solution is to have a range of simple applications which introduce people to the sorts of tasks which electronic administration requires. This is eminently suitable for support by Acorn users.

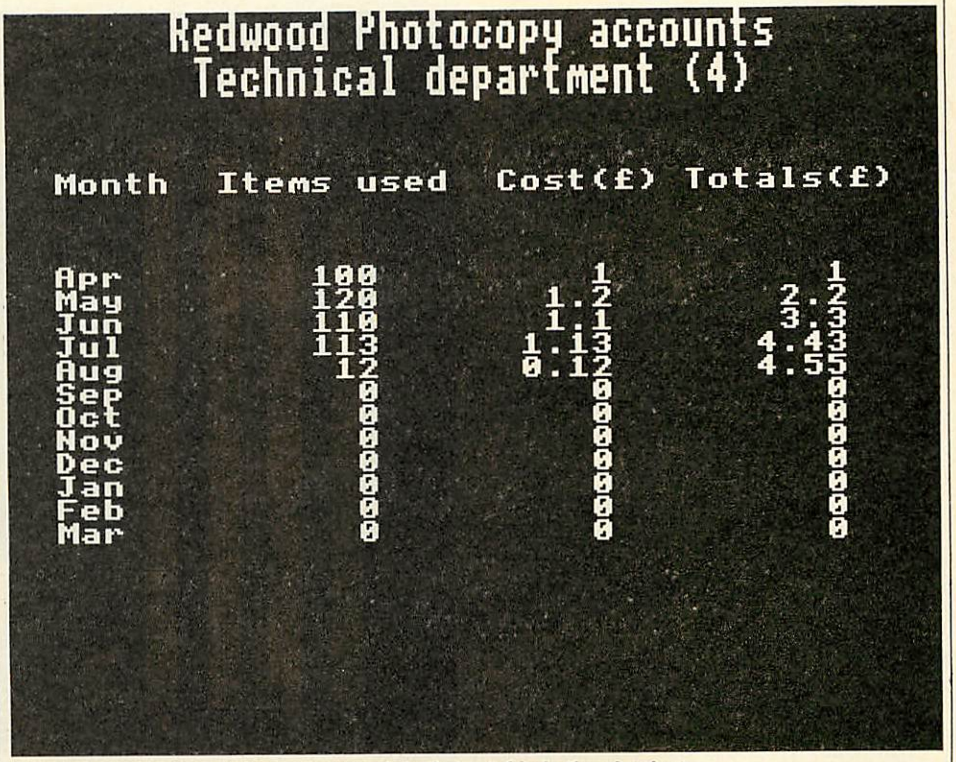
It is logical to assume that any firm, or school, with a number of departments will make shared use of some resources, for example: standard exercise books, phone calls, A4 letter paper and photocopying facilities.

So, why don't we start by introducing the concepts of the electronic admin system by developing a program which monitors the use of one of the above? We should be able to customise the program to handle different items. Remember though, that even the best program in the world can't protect itself or its files from accidental erasure. So we must encourage people to follow two good housekeeping rules: Backup discs at the start of every day, and Save files immediately after making amendments.

You will find our Acorn User Departmental Accounts program in the yellow pages. It's fairly long, so you might benefit from buying the monthly disc to save tears and errors. Because it saves files, I'd recommend that you allocate a whole DFS disc to it although it will function in any directory in all Acorn filing systems. Once the program is entered then save it immediately, and then build a startup boot file as follows:

```
*BUILD !BOOT
0001 MODE 129:CH."BILLS"
0002
ESCAPE
*OPT4,3
```

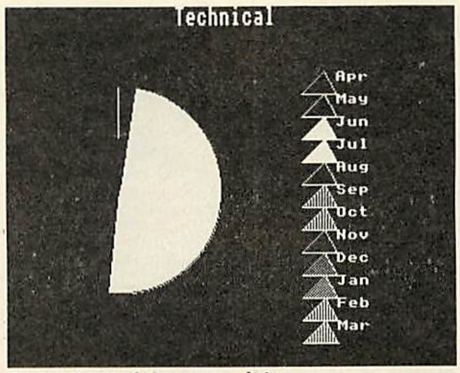
Start up the program with Shift-Break. A front page will appear with the program title as part of a border, inside which you have the main menu. Pressing Escape will always return you to this menu



Redwood Photocopy accounts
Technical department (4)

Month	Items used	Cost(£)	Totals(£)
Apr	100	1	1
May	120	1.2	2.2
Jun	110	1.1	3.3
Jul	113	1.13	4.43
Aug	12	0.12	4.55
Sep	0	0	0
Oct	0	0	0
Nov	0	0	0
Dec	0	0	0
Jan	0	0	0
Feb	0	0	0
Mar	0	0	0

There are four ways of displaying the data, but a table is the simplest



A pie chart of the same data

although sometimes you might have to press it twice, as that key is also used to exit other areas of the program.

The main menu gives the user six options which can be accessed by typing a number 1-6, then pressing Return at the Which prompt. The options are as follows: Files, Edit, Cost per copy, Display, New and Exit.

Option 5 clears memory and re-runs the program while option 6 returns the program back to Basic. They are provided so that incorrect accounts can be erased. They also provide a legal exit route from the program.

Creating an account

The easiest way of learning how to use the package is to begin monitoring some accounts. We'll start by creating a photocopying package. Start the program with Shift-Break to get the main menu. Now select New by pressing 5 then Return. Now press 2 then Return to select Edit. A new menu appears. Press 1 then Return to select Customise. When that screen appears just type the title 'Redwood Photocopier Accounts' and press Return. Use the Caps Lock and Shift keys to get upper and lower case. Once this is done the Edit menu reappears and the survey title replaces the top of the screen.

Next, still in the Edit menu, select department headings by pressing 2. A screen with up to 20 department headings appears. Use the cursor up and down keys to move to the next blank line, and then press the Tab key.

This lets you type a department heading. Once the heading is typed, press Return and move onto the next blank line with the cursor keys. Again the Caps and Shift keys are available.

When all the headings are typed press Return for the last time and then press Escape to leave this section. Back in the Edit menu again, simply press Return again to move on to the main menu.

At the main menu you select option 3 and this expands into a larger menu from which you can either return to the main menu or move on to set the cost per item. Unlike the care of spreadsheets, altering this value does not change all the accounts. What actually happens is that the new cost is used only when a new entry (or amendment) is made in any department's accounts. This means that the cost of photocopying can rise during

the year, and all the costings can be accurately monitored.

Once the item is selected and the cost per item altered (remember to input in pence) then return to the main menu by simply pressing Escape a couple of times.

Completing accounts

To complete accounts you first select option 2 – the Edit menu. Next select option 3. You now have a list of departments. Move the cursor bar up or down until it is highlighting the department whose accounts you wish to enter. Press Tab and a new screen will appear. This has a table of 12 months by four columns. Look at figure 1.

MONTHS	ITEMS	COST	TOTAL
APR	213	416	416
MAY	240	480	896
JUN	250	250	1146
JUL			
AUG			
SEP			
OCT			
NOV			
DEC			
JAN			
FEB			
MAR			

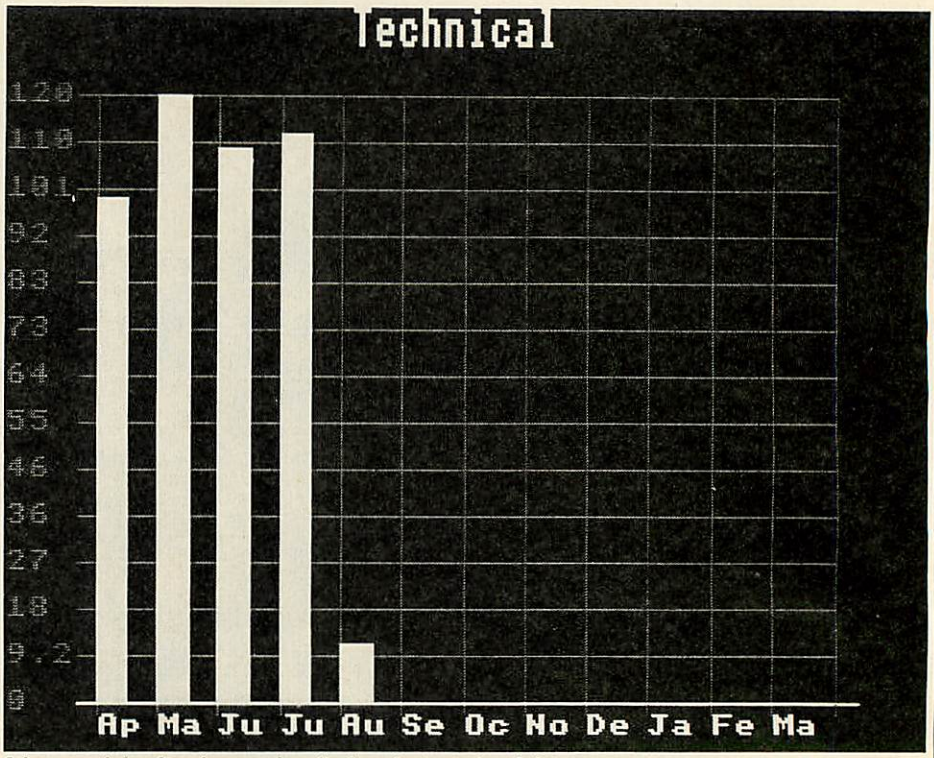
Figure 1. Layout of department account

The only active column is the one marked 'items', which allows you to enter the number of items which in this case is photocopies, which this department has used. Move the highlight bar until you reach the column to be modified and then press Tab. Type in the changes and press Return.

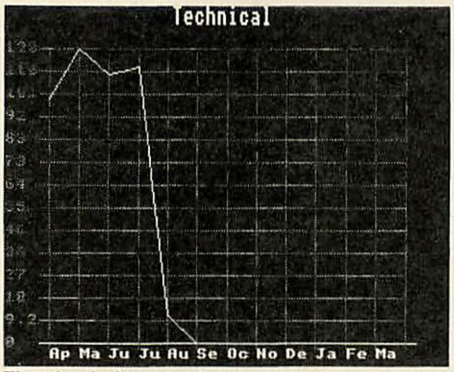
The cost in pounds (£) of those photocopies is now calculated using the cost per photocopy entered previously, and this is entered in the cost column. The final column is updated with the current running total.

Once the data for the current month is entered press Return a final time, then hit Escape to go back to the Edit menu. Now select another department and enter its photocopy usage in the same way. If you need to change some data previously entered just move to it and press Tab to re-enter it.

Once all the categories in the survey have been entered, pressing Escape twice gets back to the main menu.



A bar graph is often favoured as it gives instant visual data



The simple line graph

Displaying the results

Sometimes it is important to provide graphical display of the accounts to date for each department. This is done through a built-in graphing package. The program is designed to consider only the number of items used. For example, it looks at the photocopies rather than the costings. This is simply because the number of items used is generally of more predictive use than the current cost. To begin you select option 4 in the main menu and then choose one of the display options: these are Table, Pie chart, Bar graph or Line graph.

A department screen is requested and this is entered as indicated previously. Once Tab is pressed the departmental account requested is presented in a graphical form. A message gives us the option of exiting from the graph back to the display menu by pressing Space. The letter P can be pressed to start a screen dump to a black and white Epson-compatible printer. The Basic routine takes about five minutes to complete, and then the display menu appears.

Always setup the printer before starting to print, otherwise you may find the system will hang-up. Although the Escape key will cure this, the graph will vanish and will need to be reselected.

The last options are in the file menu. These allow you to store and retrieve accounts. The options available allow us to: catalogue the disc, open (load) or save a billing file, or delete a file from disc. You can also print a draft copy of the complete accounts.

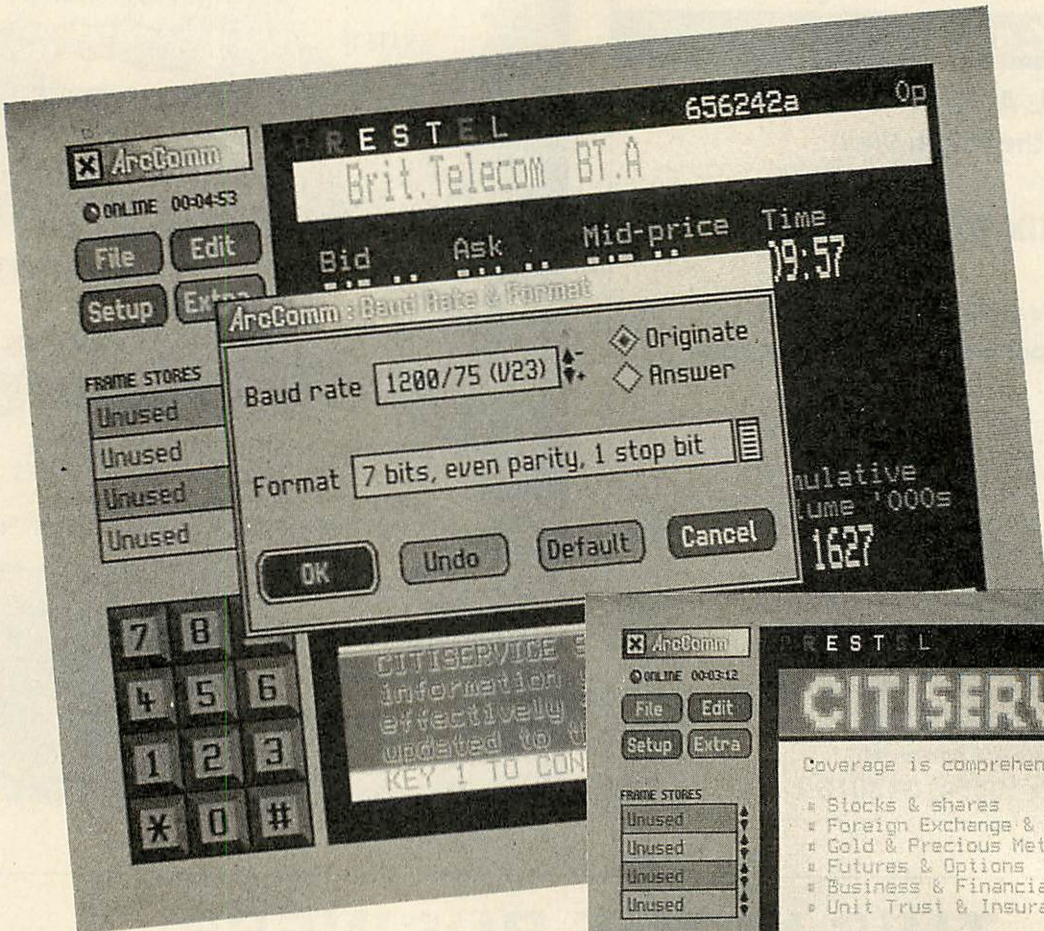
You can catalogue the disc by selecting the first option. Press the space bar to get back to the main menu.

The next three options include Load (open), Save and Return. After selecting any one of these you must first type a filename and then press Return. The program will open, save or delete a file. Note that if you just press Return by itself, this will always generate a catalogue as a reminder of the filenames available. From this catalogue you will be able to return to the filing routine whether it is Load, Save or Delete.

The idea of printing a draft file allows you to get an overall picture of the whole set of accounts for the full range of departments, on just a few sheets of paper. Please make sure the printer is setup before selecting this option.

OFFERS

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Taking full advantage of the Risc OS, *ArcComm* is a unique new communications package for the Archimedes.

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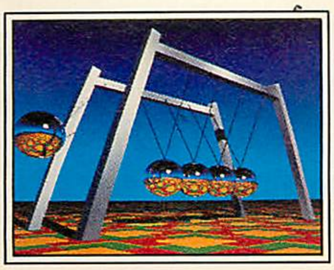
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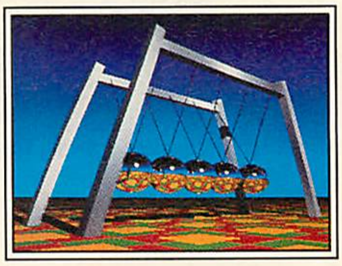
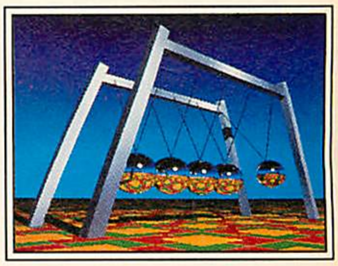
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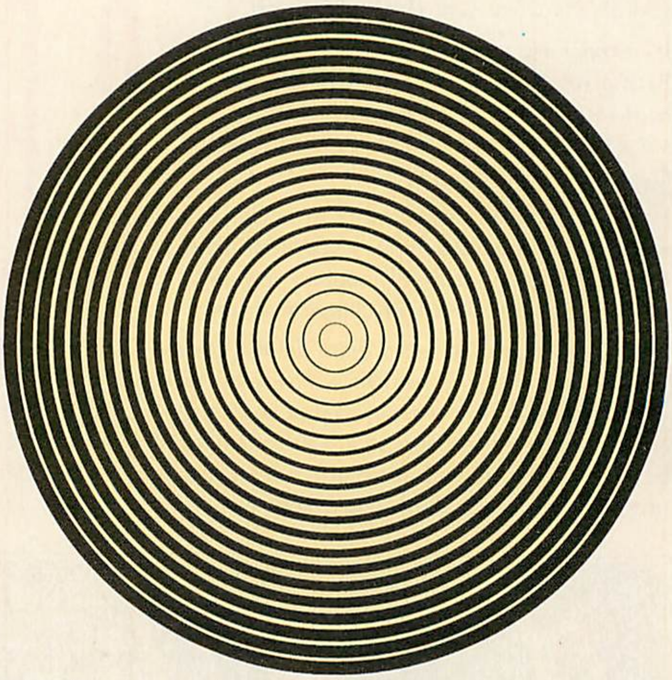
Postscript

The latest concept in printing technology is not as daunting as it first appeared. In fact it's quite the opposite

David Atherton

Anyone considering the purchase of a laser printer these days will have come across the term Postscript and noticed that a printer with this feature tends to cost twice as much as a standard laser printer, or 10 times as much as a dot-matrix machine. What, then is Postscript and what benefits can it offer which cost so much?

Postscript is a programming language to control printer output. It is a true programming language, just like Basic or C, rather than the simple stream of Escape codes which are commonly used with dot-matrix printers.



Postscript makes drawing varying line thicknesses easy

Loops, conditional statements, variables and arithmetic are all supported. If you want a comparison, the most similar language is Forth. Postscript is a 'Threaded Interpretive stack-based' language and Reverse Polish Notation (RPN) is used throughout. For example Basic's PRINT 5+7 is represented as 5 7 + . in Forth, and as 5 7 add == in Postscript.

Being a threaded interpreter, Postscript is almost as fast as it is when executing user-defined keywords with core commands. There isn't room here to cover RPN and stack-based languages in full, but briefly they work by placing all parameters to a command onto a last-in first-out (LIFO) stack.

It is essential that every command has a fixed number of parameters; each command takes its required parameters off the stack, and places any values it generates back onto it. User routines are defined and again have fixed numbers of entry and exit parameters, which are also taken from, and are then placed back on the stack.

Arithmetic is always done on the stack and operators exist to add, subtract, multiply and so on using the top two stack items. There are also commands to change the order of items on the stack.

Variables do exist, but once defined, altering their values is done by placing the old value on the stack, altering it, and reloading the new value from the stack. The strength of a threaded interpretive language is that once a new procedure has been defined, it can be considered to be part of the language. There are no local/global variable considerations, and the procedure is invoked simply by typing its name.

To enable libraries of procedures to be used with a number of programs, they can be defined as Postscript 'dictionaries' which are preloaded before your program. Quite complex graphics commands can be defined in this way.

This level of complexity means that all Postscript printers are in fact, fully fledged computer systems, with processor (which is usually a Motorola 68000), RAM and ROM. Although they have no keyboard or screen the computer port of the printer is considerably more powerful than the BBC micro itself.

You can quite happily write programs other than for printing purposes, and it is even possible to use Postscript in immediate mode and direct output back to the host computer's serial port, rather than to the printed page.

Of course, Postscript devices are rather expensive for this purpose. The main use of Postscript is to manipulate text and graphics on the printed page. The commands to do so are very similar to those used on a screen, for example:

```
0 0 moveto
100 200 moveto
200 100 moveto
0 0 moveto
stroke
showpage
```

will draw a triangle with endpoints 0, 0 100, 200 and 200, 100. There are no separate Draw and Move commands in

CALLIGRAPHY BY ANDREW WHITELEY

Postscript. The imaginary graphics cursor moves along leaving a line behind it until either 'closepath' (draw a line back to where you started) or 'newpath' (start again at 0, 0) is issued.

The Moveto command is roughly equivalent to the Draw command in BBC Basic, except that nothing is drawn until either the Stroke or a Closepath command is issued. All lines are drawn with either this command or Curveto, a command which draws an arc with start and end points and radius specifications. Procedures can easily be built up to draw boxes, circles, and so on, and graphics can be filled with the 'fill' command.

The Postscript specification does support colour but this is not implemented on many printers at the moment. Monochrome Postscript printers achieve shading, either on the lines, or the fill pattern, with the Setgray command, which takes arguments between 0 (black) and 1 (white).

Commands also exist to move the origin point (translate) which by default starts at the bottom left hand corner of the page. There are also commands to rotate all output by a given number of degrees. These are shown to good effect in the example listing.

The final command in the short example above is Showpage meaning 'print the page'. Until this point, all output is stored in the printer's memory, in a 'virtual' page, roughly equivalent to screen memory.

Obviously an 8x11-inch page at 300 dots per inch has a resolution of 2400x3300 pixels, requiring just under eight million bits, or 1Mb. For this reason, Postscript printers always have a minimum of one, and as much as 16Mb of on-board memory.

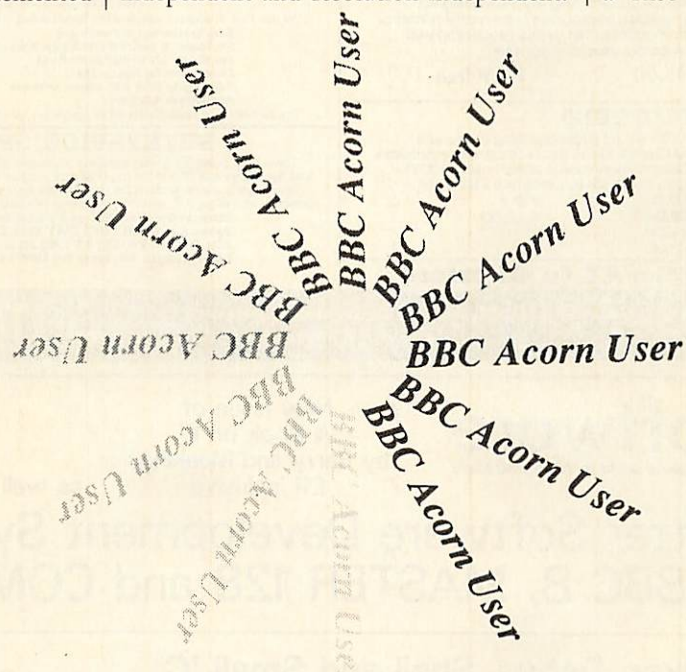
There is no other way of achieving high resolution page printing, as laser printers, typesetting machines and other page-oriented non-impact systems can only print the whole page in one go, rather as photocopiers can.

It follows that Postscript printers are much faster at printing repeat copies of one page than multiple different pages and it is the repeat copy rate that is usually quoted by manufacturers in their pages-per-minute claims.

A common rated speed for the cheaper laser printers is six pages per minute. If there are 5600 (80x70) characters on an A4 page, this means a nominal speed of 560 characters per second. The true rate, with, say, six different pages of normal text is about half this, still favourable in comparison to dot-matrix machines.

Text handling in Postscript is very flexible. The language includes a specific format for fonts and hundreds of industry-standard typefaces are available. Almost all Postscript printers come with at least four typefaces and some come with many more.

The reason Postscript is considered so important is that it is both device-independent and resolution independent.



Produced by the sample program in the yellow pages

Device independence means the language is standard, and like the Epson code set for dot-matrix printers, programmers know that by providing Postscript output, their programs can output to a wide range of printers.

Resolution independence means that because Postscript uses vectors rather than bitmaps, the higher the quality of the output device, the better the image is. Postscript is provided on laser printers working at 300 dots per inch (dpi), typesetting machines working at between 1200 and 2400 dpi, photographic slidemaking machines at 4000 dpi, and other devices such as vinyl cutting machines.

This allows high quality typesetting and artwork to be produced on screen, where the resolution is only about 80 dpi, secure in the knowledge that the printed output will be vastly superior to the screen image.

Postscript files, which are always plain text files, can be sent on disc to companies which own the expensive output machines and transmitted by serial link to the output machines. The only requirement is that the bureau has the relevant font definition files for any fonts that you have used in your document. Graphics will always work.

A smaller scale version of this operation might be where you either write Postscript programs on your own BBC micro or prepare Postscript output using a Risc OS-based Archimedes package, save it to disc and then take it to work or school and print it out on the Postscript printer there.

Postscript fonts are also vectored, and consist of a series of lines and curves to draw each character, in an internal form, rather than the full long-winded textual description. Some are supplied in the printer's ROM, and others can be downloaded using a special protocol.

The screen representations are done by normal bitmap fonts, but the widths on screen are an exact match of the font metrics, ensuring that, for example, right justification on the screen actually matches the printed output.

It is important when using Postscript to understand the difference between programs which use vector graphics (often called 'drawing') and bitmap graphics ('painting'). Although the end results of using each can very well be the same on screen, the storage method is very different.

Drawing programs work by storing the co-ordinates of all the lines drawn – a single dot being treated as a line one pixel in length – together with details of whether the line is straight or curved, and for curved lines, the radial angle of the curve. Painting programs use a fixed size of screen. Whatever is drawn, the stored picture is the same size, being the number of bytes required to store all the pixels and colours in the picture.

There are two basic differences between these two approaches. The first is

the picture creation method – drawing programs allow you to draw, say, a rectangle, place another shape on top of it, and then reactivate the rectangle and move it elsewhere or resize it without affecting the other shape.

With painting, once a shape has been placed on screen, it is irrevocably blended with all the other graphics in that area. However, to produce special effects like airbrushing and to cut-and-paste chunks of screen irrespective of the contents is only really possible with the painting approach.

The result is that drawing is good for design, technical drawing, and line art, whereas bitmaps are good for sketching and illustrative art – as indeed they are on a micro's screen.

The second difference is that vector graphics are resolution independent. This means that they can be reproduced with no loss of quality at any size within the mechanical limits of the printer and with any resolution on the output device. The obvious example of this is a circle.

If you write a program to magnify a small screen area, say by four times, and there is a circle drawn in that area, then the magnified result will be jagged and unsightly. If, however, you store the codes required to produce the shape, multiply their values by four, and redraw the circle, the larger circle will be as smooth as the original.

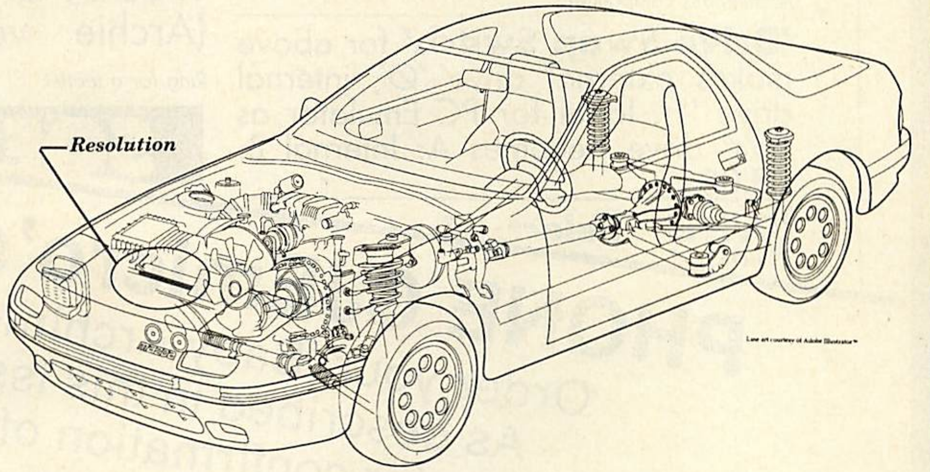
Postscript devices normally use a much higher resolution than that of the screen. In screen terminology, an A4-size 300dpi Postscript printer can print in an area of co-ordinates 3500x2400. With vector graphics, you can get the same quality of reproduction as you see on screen. With bitmap graphics from a BBC micro's screen of say 320x256, you either print a tiny dump in the corner of the paper, or effectively reduce the resolution to an eighth of the normal.

Bitmap graphics are used by virtually all BBC micro and Archimedes art programs and as such, although Postscript printers can reproduce the pictures, they do not improve on the screen quality. However, on the Archimedes, the *Draw* program which is bundled with Risc OS should spawn a host of improved versions using the vector graphics principle such as Janson's *Drawing Board*, one of the first vector or 'object' drawing programs.

At its simplest level, text is printed in Postscript by selecting a font and size (any size is available), and using the Show command preceded by the required text in brackets.

More complex printing options are also available. Text positioning is done by using the Moveto command in a similar way to the 'print at text cursor' (VDU 5) so although each line of text can be printed without an additional made command, moving to a new line must be explicitly clear.

However, this can simply be achieved by defining a 'new line' procedure which performs a moveto operation back to the left margin, and down by the required line spacing. All the graphics operators such as grey settings and line thickness, are available for text just as they are also



Postscript can produce quite technical diagrams in great detail

for graphics.

Text handling can be much more complex if desired, using the 'kshow' operator which prints a string of text but executes a named procedure between each letter. This allows kerning and tracking (the adjustment of space between letters) and special effects such as sending text round curves. The nice thing about Postscript is that the whole text printing process can be as simple or as complicated as you like.

Postscript programs are plain seven-bit Ascii text files and all printed output must first be converted to a Postscript program before it can be sent. In the Risc OS operating system on the Archimedes, a printer driver is provided which performs this task, when sending text and code output from wordprocessing programs.

Like much Risc OS system information, the driver interface routines are not yet available, but soon will be, and these will take the hard work out of creating the necessary Postscript from a given piece of text or graphics.

If you write your own Postscript programs, they would be sent to the printer just like any other text. The simplest way to do this, from either a BBC micro or an Archimedes is to write the program in a wordprocessor, and select the normal print option.

If using Risc OS, select a pure Ascii driver, not the Postscript driver, and don't embed any wordprocessor control codes in your text.

The text will be sent to the Postscript interpreter in the printer, and immediately executed. The last command should always be Showpage. You could even simply *Type the program, pressing CTRL-B before pressing Return after you've entered the filename.

An interesting method of exploring the stack, and entering commands line by line is to use Postscript's direct mode. For this you will need a Postscript printer with a serial interface and a terminal program – any scrolling terminal will do.

Connect at the baud rate of the printer, and type 'executive' and Return. The word will not be echoed but a message will appear showing the Postscript version number and a prompt, PS>. At this prompt you can type any Postscript command, which will be executed. The == command will display the top stack item on screen and the Showpage command will print out anything which has been written to the current page. To leave executive mode, type CTRL-T.

Postscript is designed to work with vectors but it will also deal with bitmap graphics, so a Postscript screen dump

program can easily be written. The operator 'image' deals with this, and takes the bitmap data from the stack. As stated above, all Postscript code is seven-bit Ascii so the bitmaps must be sent to the printer in Ascii hex format – 255 (or &FF) is actually sent as two 'F' characters (Ascii 70).

This means all binary data takes twice as long to download as it would otherwise. The language allows you to define how many grey levels there are on the picture, and therefore how many pixels each byte represents.

So, the screen dump programs for, say, different Beeb screen modes are very similar in the data they send from screen memory. Bitmaps may be included as part of a larger vector graphics program and can easily be repeated by normal stack operations.

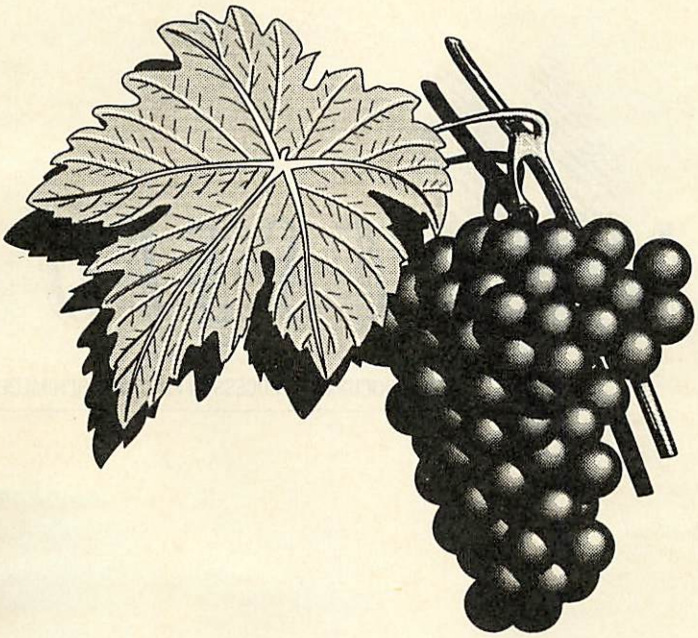
There are two useful formats which prevail in the world of Postscript and desktop publishing. EPSF (Encapsulated Postscript Format) is a file format which contains both a Postscript program and a bitmap which represents the screen image. Obviously the screen part will be different for each computer (and each screen mode!) So far no EPSF screen portion has been defined for the Archimedes, although it should be straightforward to display IBM EPSF. Graphics libraries are usually stored in this format.

The other format, used by many image scanners is TIFF (Tagged Image File Format) which offers a high degree of compression for storing the large bitmaps produced. Forthcoming Archimedes desktop publishing programs such as Computer Concepts' *Impression* will use the TIFF format for files, ensuring compatibility with a wide range of image-acquisition hardware.

Postscript was invented by an American company called Adobe Systems, which licences the technology to laser printer manufacturers and charges a hefty royalty on each printer. This is reputed to be the reason why Postscript printers are so expensive, although the large amounts of ROM and RAM needed also play a part.

Adobe also produces fonts which are licenced from traditional type libraries (rather than being the inventions of computer engineers) and many of these are supplied as standard in the ROMs of Postscript printers. Further fonts are available from Adobe, which can be downloaded into the printer's RAM.

Regrettably, although the fonts are only data for the Postscript processor and the host computer does not read them as anything other than as a terminal, the discs and downloader program are only supplied for MS-DOS and Macintosh computers.



Shading and texture are handled well

It should not be beyond the wit of some enterprising software house to produce an Archimedes downloader program which can also read the MS-DOS 3.5-inch disc versions of the fonts.

As you might expect with any standard, other people have tried to emulate it. There are a few printers on the market which are 'Postscript-compatible'. This means that they will work with Postscript output from the computer but the language on the printer is not Adobe's version. For example, the Qume CrystalPrint Publisher uses a clone language from Bitstream, a well-known PC font publisher. Bitstream has also had to emulate the standard fonts supplied with the machine, as Adobe fonts have a coding system which can only work with Adobe Postscript implementations. This coding is not difficult to decypher but Adobe also has legal protection in that Adobe fonts are only licenced for use on genuine Postscript interpreters.

Alternative Postscript manufacturers therefore have to replicate all Adobe's work in producing complete type libraries. The major traditional type libraries boast many thousands of fonts and this poses a major problem for the competitors, as Adobe already enjoys the exclusive rights to produce Postscript versions for most of them.

Another problem is font metrics, the space taken up by each letter of each font. This is vital in professional typesetting. If a 30,000 word typescript is being set and the tables (or previous setting) show this to run to 120 pages in Century 10 on 11 point (a font name and size) and a 'clone' manufacturer offers a font which looks the same as Century, it must make sure the metrics are also identical, otherwise it could occur that the setting when printed will not be the same length. This can be critical for items like tables running over pages and so on.

The problem is that if the metrics are identical, the size of each character is identical, so some differences must be introduced to avoid making a direct copy of the original.

It is for this copyright reason that fonts produced by alternative manufacturers always have slightly different names to the originals, for example copies of Helvetica (copyrighted in name and design) are called 'Swiss' or 'Helv', and copies of The Times New Roman (Times) are given names such as 'TmsRmn' or 'Dutch'.

If you are interested in Postscript programming, there are three essential books written by Adobe Systems and published by Addison-Wesley, colloquially known as the blue book, the red book, and the green book, from their jacket colours: *Postscript Language: Tutorial and Cookbook* ISBN 0-201-10179-3 (blue), *Postscript Language: Reference Manual* ISBN 0-201-10174-2 (Red) and *Postscript Language: Program Design* ISBN 0-201-14396-8 (Green).

The books are quite expensive at nearly £20 each. If you can't afford all three, the blue book is the best one to get started with. All the books are available from bookshops or from Computer Manuals on 021-706 1250.

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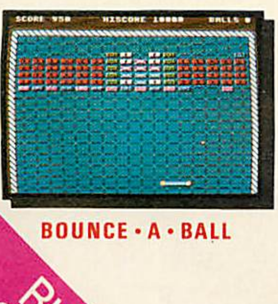
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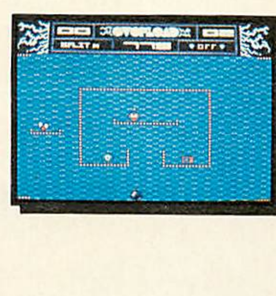
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RUNNING VARIABLES

We explain how BBC Basic stores and keeps track of its variables and how you can pass variables between separate Basic programs

John Stanley

In BBC Basic variables are always stored in a separate list, one for each initial character of the variable name. By extracting one (or more) of these lists from the heap and locating it in another part of RAM, a variable list can be created that is secure from anything but switching off the machine. These Machine Environment Variables (MEVs) may be read from or reassigned as if they had been declared within the currently running program.

This article gives a description of how BBC Basic stores and keeps track of its variables and explains how Basic's pointers may be redirected to locate MEVs in the Econet workspace. In the yellow pages there's a suite of three short programs to demonstrate the technique.

The store of variables on the heap starts at LOMEM (by default LOMEM = TOP) in the area of RAM immediately following the program listing. The heap grows upwards as variables are newly assigned or DIMensioned. If it should meet the Basic stack growing down from HIMEM then the fatal error message 'No Room' is given.

The two-byte pointer at &0002, &0003 (lowbyte, highbyte) points to the first free memory location at the top of the heap. This will be called the freemem pointer. If no variables have been stored and no procedures or functions have been called it points to LOMEM. Freemem is one of the pointers that will be redirected.

The valid initial characters for a variable name are A - Z, a - z, the pound sterling character and the underline character. BBC Basic has 57 two-byte pointers (one for each of the 57 initial characters) which point to the location in the heap of the first occurrence of a variable of the appropriate initial character. Each variable in the heap is formatted thus:

|p1|p2|var name|0|variable content|

where |p1|p2| is a two-byte pointer to the location in the heap of the next variable of the same initial character. If there isn't one, it points to zero. The variable name less the first one and including %, $ or (for integers, strings and arrays respectively is known as |var name|. The end of 'var name' is marked with a single byte set to zero, |0| while |variable content| indicates the formats depending on the variable type.

It is important to remember that the content of string variables and arrays of strings is not necessarily stored contiguously with the variable name. You should also note that |variable content| is data defining the structure of the string or array of strings and pointers to the location of the variable contents.

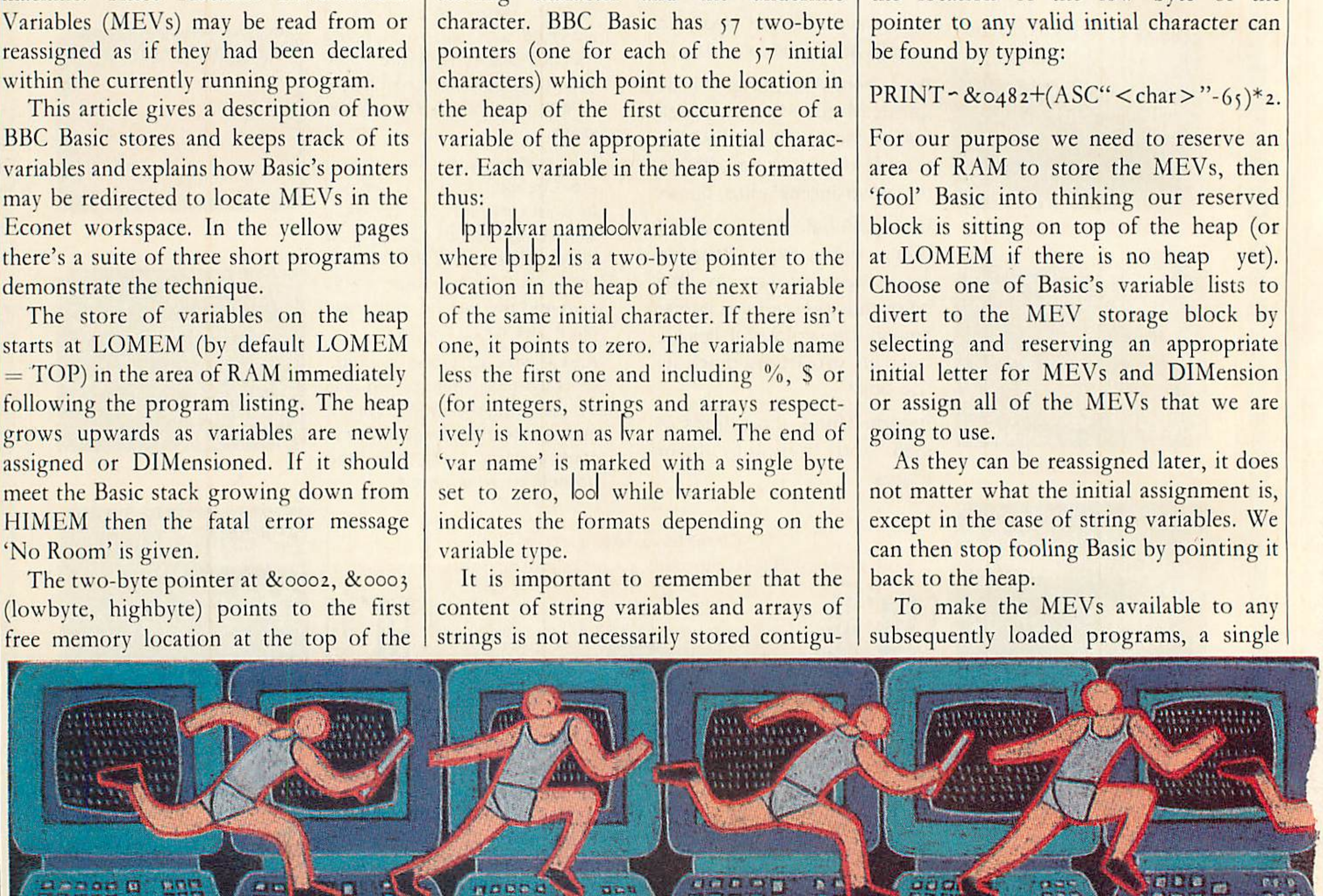
The pointer to the start of the 'A' list resides at &0482, &0483 (lowbyte, highbyte) and as each pointer uses two bytes the location of the low byte of the pointer to any valid initial character can be found by typing:

PRINT ~&0482+(ASC"<char>"-65)*2.

For our purpose we need to reserve an area of RAM to store the MEVs, then 'fool' Basic into thinking our reserved block is sitting on top of the heap (or at LOMEM if there is no heap yet). Choose one of Basic's variable lists to divert to the MEV storage block by selecting and reserving an appropriate initial letter for MEVs and DIMension or assign all of the MEVs that we are going to use.

As they can be reassigned later, it does not matter what the initial assignment is, except in the case of string variables. We can then stop fooling Basic by pointing it back to the heap.

To make the MEVs available to any subsequently loaded programs, a single



MICHAEL McCABE

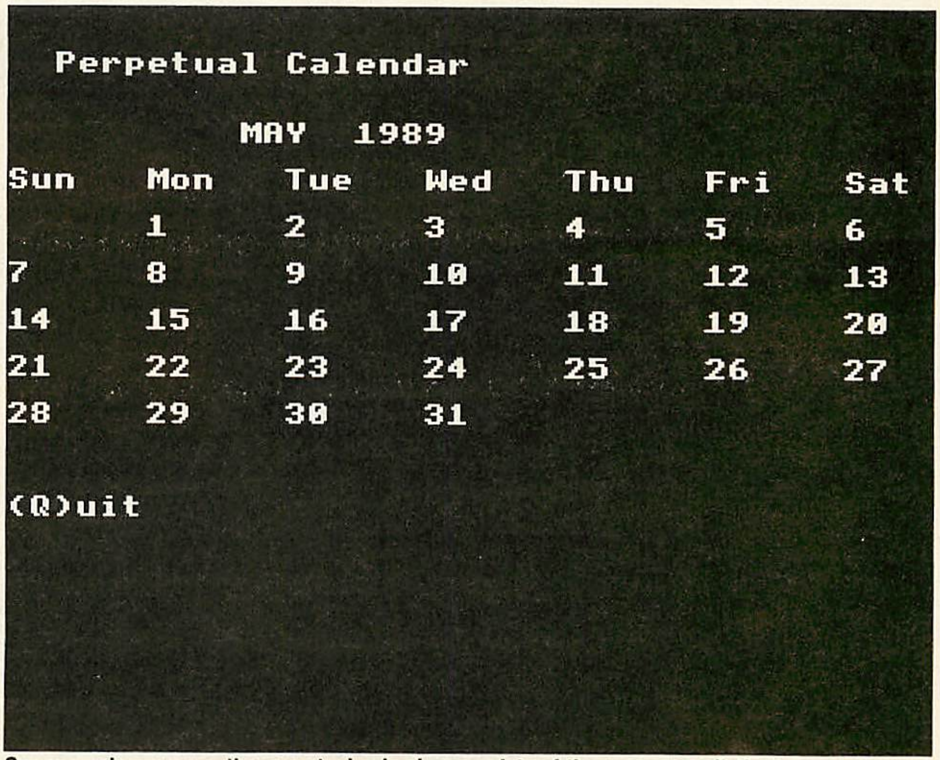
line statement in the program to redirect Basic's list pointer for the reserved initial character to the MEV storage block makes the MEVs available to the current program exactly as if they were program variables themselves.

In the normal course of events, if a string is lengthened by reassignment or concatenation to exceed the space allowed for it in its initial location, the string content is relocated at freemem – the top of the heap. So MEV string variables and string arrays must be initially assigned to a maximum length (the actual content is unimportant) which cannot be exceeded later. The storage block for MEVs can be reserved by increasing PAGE or decreasing HIMEM but these locations are not secure from a hard break or from any MODE statements.

If Econet is not being used then its workspace provides a secure block of 512 bytes from &0B00 to &0CFF. If the cassette filing system and the RS423 serial interface are not being used for input then the next page down in RAM from &0A00 to &0AFF is also available providing a single block of 768 bytes. This assumes another program has not bagged the space first, of course.

Having decided where to put the MEVs, we must ensure the allocated storage space is not exceeded. A routine to read the freemem pointer and test it against the upper limit of the storage block would be fairly straightforward but I prefer to *Save it and then *Dump it on the screen. By including an end of list marker in the MEVs, a clear picture of how space is being allocated can be gained from the file dump during program development.

So, as an example let's choose Z as the reserved initial character for MEVs, the Econet workspace as the storage block, and then use a perpetual calendar as a demonstration program and rather ludicrously (but it helps for the purpose of demonstration) split it into three separate program listings. Why Z you may ask. I normally use the pound sterling symbol



Our example program, the perpetual calender, consists of three separate listings

but it does not print true on some printers, including mine, and I haven't fixed it yet!

The demonstration programs have the sequence CALCONFIG which declares all the MEVs, stores them in the Econet workspace, restores the freemem pointer and then assigns a meaningful content to the string variables. PC inputs year and month data from the keyboard and PRNTCAL, which reads the MEVs, then calculates the day of the week for the first day of the month (using Singleton's formula for Julian day number) and outputs a calendar for the input year and month to the screen.

Although Singleton's formula gives a valid Julian day number, even as far back as the year dot, Pope Gregory decided to mess about with the calendar in the late 1500s so the PC listing rejects any years prior to 1600.

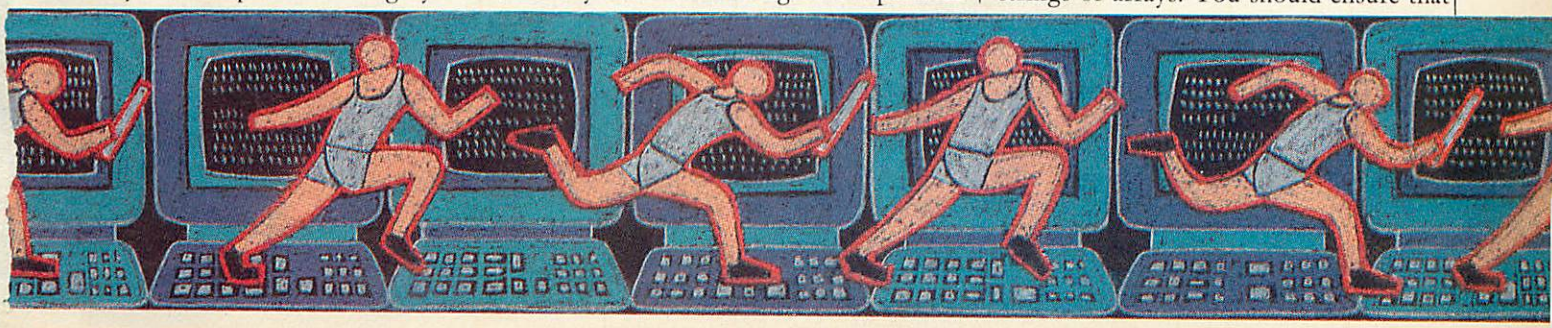
To demonstrate the solidity of MEVs, type in the listings, save them to disc and then CHAIN "CALCONFIG" to set up the day and month strings. Now perform a hard break and then CHAIN "PC", enter the year and month and you will find the MEVs are still there. Perform another hard break and CHAIN "PRNTCAL" and the selected monthly calendar will be re-screened from the stored MEVs data.

The procedure for setting up MEVs is as follows, with references to the example listings in brackets.

First, decide on an initial character for the MEVs (Z) and the storage block to be reserved for them (the Econet workspace from &0B00 to &0CFF).

Next, assign the value of the freemem pointer to a variable or variables by using the byte indirection operator, ?. (CALCONFIG line 180 stores to pp% and qq% – lowbyte, highbyte – yet it's alright they can be recovered!) Redirect the freemem pointer to MEVstart using ?. (CALCONFIG line 190 points freemem to &0B00).

Now, dimension or assign all MEVs. These may be real numbers, integers, strings or arrays. You should ensure that



string variables are initially assigned at a length that will not be subsequently exceeded and that all the variable names assigned at this stage begin with the selected initial character. (CALCONFIG lines 220 to 360.)

If you are proposing to use the *Save-*Dump routine for testing overflow, insert a recognisable end-of-MEV-list marker (CALCONFIG line 390).

Restore the freemem pointer to its original value (CALCONFIG line 430 restores it from pp% to qq%). There is now no restriction on assigning new variables in the normal way, they will be stored on the heap. No further variables' names with the reserved initial character should be declared either within the same program or any other programs which will use the MEVs.

Now test for overflow of the storage block. You can do this either by inserting a discreet routine to test (freemempointer)+(length of variable to be declared) against (MEVend), or, as in the example listings, by dumping the memory block to screen or printer. (If T% is set to -1 before running CALCONFIG then PROCtest dumps the storage block to screen and resets T% to zero). While in the same program that configures the MEVs, they can be reassigned without the need to redirect the list pointer.

If the Basic variables pointers are reset by loading or running another program or by issuing a CLEAR command, then the MEVs are made available again by setting the list pointer for the reserved initial letter to MEVstart (PC line 110 and PRNTCAL line 110).

MEVs may now be reassigned with the one provision that string variables must not exceed their declared length.

If you actually want to use the perpetual calendar, I advise you to rewrite it as a single program, or maybe someone out there would like to rewrite it as a memory resident code – hopefully not resident in the Econet workspace!

PROCin in the PC listings provides a gentle introduction to recursion. If you are worried about how many times it will reject an unacceptable entry, then type in and run the listing RECUR and see how long it takes for stack to exceed its bounds. Then remove the REM to make line 70 active and run it again.

```
000B00 41 0B 6D 6F 6E 74 68 24 A.month$
000B08 28 00 03 0D 00 F2 0B 11 (.......
000B10 09 03 0C 11 07 14 0C 11 ........
000B18 08 25 0C 11 05 36 0C 11 .%...6..
000B20 05 47 0C 11 03 58 0C 11 .G...X..
000B28 04 69 0C 11 04 7A 0C 11 .i...z..
000B30 06 8B 0C 11 09 9C 0C 11 ........
000B38 07 AD 0C 11 08 BE 0C 11 ........
000B40 08 85 0B 6C 65 6E 4D 6F ...lenMo
000B48 6E 74 68 25 28 00 03 0D nth%(...
000B50 00 00 00 00 00 1F 00 00 ........
000B58 00 1C 00 00 00 1F 00 00 ........
000B60 00 1E 00 00 00 1F 00 00 ........
000B68 00 1E 00 00 00 1F 00 00 ........
000B70 00 1F 00 00 00 1E 00 00 ........
000B78 00 1F 00 00 00 1E 00 00 ........
000B80 00 1F 00 00 00 B2 0B 77 .......w
000B88 6B 64 61 79 24 28 00 03 kday$(..
000B90 08 00 CF 0C 03 03 D2 0C ........
000B98 03 03 D5 0C 03 03 D8 0C ........
000BA0 03 03 DB 0C 03 03 DE 0C ........
000BA8 03 03 E1 0C 03 03 E4 0C ........
000BB0 03 03 BF 0B 6D 6F 6E 74 ....mont
000BB8 68 25 00 00 00 00 00 CB h%......
000BC0 0B 79 65 61 72 25 00 00 .year%..
```

Check with the text that you know how to obtain Basic's variable list structure

If you want to use the calendar as it is then once CALCONFIG has been run when the MEVs are resident, CHAIN "PC" will put you into the calendar.

To have a clear picture of Basic's variable list structure, switch off your Beeb for a few seconds to clear the RAM, switch on, put your printer on line and type CHAIN "CALCONFIG" and wait for the 'year and month' prompt. Press Escape and type *Save MEM 0000 0D00 *Dump MEM 0B00. The resulting dump will show the MEV storage block &0B00 to &0CFF as in CALCONFIG's test routine but with the actual RAM address locations. Referring to the outline of Basic's variable storage format given above, you will be in a position to follow up the list pointers to the end-of-list 00.

With a bit of patience you will also be able to see how the string variables point to their various dismembered parts. To help in tracing the string arrays note that after the end of the name marker |00| the format is:

|2*DIM+1| dimension of array |address |bytes allocated |bytes used|

where 2*DIM+1 is one byte, dimensions of array gives a two-byte length for each element, address gives the two-byte address of the element, and bytes allocated and bytes used are each a single byte. Oh! And don't forget that the lowbyte always comes first.



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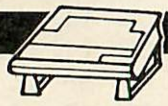
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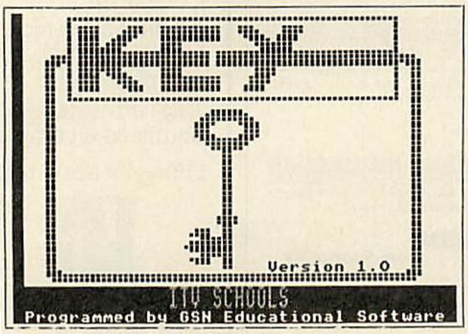
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SWAP!

There is little in the way of standardisation in our educational databases. However, knowing what they do have in common can open up new possibilities

Chris Drage and Nick Evans



Key: a low cost, compact system

One of the most annoying features of the database systems in use in education at the moment is that there isn't enough standardisation in their operation. Indeed, should you want to interrogate a datafile created for *Key* on a *ViewStore* system there would be little chance of your succeeding unless you had conversion utilities or sufficient knowledge of the datafile structure to write a convert routine for yourself.

Although this article will not give you any ready made routines for such conversions, it will help you find ways of making the most of the systems you do have and find systems with a certain level of similarity.

The question is: 'What makes an educational database system?' Although simple, the answer is nonetheless important: an educational database system is one designed with children and the curriculum in mind. However on that basis there are few systems which really pass muster. Most are complex to some degree or another with a bewildering array of facilities or, worse still, use an obscure interrogation language which must be learned before it is possible to make even the simplest query. However, we are not trying to evaluate the systems but rather to provide an overview of some of the points they have in common.

Although never designed with education in mind, one of the most consistently used systems is *ViewStore* from Acornsoft. This is well known for both its power and its obscurity! *ViewStore* is one of the few systems to employ an index system which allows the displayed records to be presented in a specified order, ready for modification. Moreover, it is probably the easiest system to use when it comes to conversion of datafiles to other systems, the export of data into a wordprocessor and the presentation of information in macros.

Key is the system which has taken the country by storm in providing an exceedingly low-cost system which offers a wide variety of facilities in a compact form. Although it has its drawbacks (mostly to do with disc-swapping on single drive systems) it is nonetheless very simple in its operation.

Quest is the grandaddy of the educational systems. It was there at the beginning and it's still going strong. Its difficult language and dry presentation belie a powerful system underneath. Many authorities have developed a range of datafiles for *Quest* and Advisory Units themselves have based much of their resource material around it. Its new big brother, *Oriel* which runs under MS-DOS and MS Windows attempts to make the whole operation much easier.

Fans of *Supastore* praise it for the single key selection on its interrogation procedure and the fact that it will run well over Econet. Devotees of *Grass* and *Find*, extol their various virtues and certainly each has an excellent educational pedigree with *Grass* linking to the *Grasshopper* spreadsheet system, and *Find* and its relation *Junior Find* providing high quality graphing and statistics.

If we look at the table it is possible to see two areas of interest. The first is some of the facilities that each system possesses; the second is the file structure of each system.

Many of the databases in the chart have no entry against the field and record separators. This is because fields are of a fixed length and the computer can count! Sorting out the beginnings and ends of fields needs to be done by a simple program which counts the characters and then inserts some type of break between fields or records.

Let us take *ViewStore* as our base product since it is on this system that we are really focusing. *ViewStore* can perform just about every operation which could be reasonably asked of a database system yet its structure is probably the simplest of all. The program does not use fixed length fields or records. For this reason each field is separated from the next by a Tab character which is stored in the memory as &09. Each record is divided from its fellows by a Return character which is &0D. If you take a *ViewStore* file and read it into *View* (the wordprocessor) you will see that where the Tab characters appear the text now jumps to the next Tab stop on the screen. This makes the transfer of data from this system very easy.

When creating datafiles we've found that *ViewStore* is the best and most flexible medium for handling data during the creation process.

Fields can be modified during data entry and their names changed at will. Their data type may be modified, their length extended or shortened and their contents easily altered.

Moreover, the choice of screen presentation as card or linear entry, as well as the ability to choose the screen mode, means users can configure the style of presentation to suit their own uses.

One of the more recent releases is *Pipedream* which most users will recognise as being a wordprocessor. It is, however, an even more flexible and dynamic medium for data entry. If you set up *Pipedream* as a linear database with field headings across the screen in separate columns, it is possible to enter data directly and to squirt it straight into *View* or *ViewStore*.

Moreover, if one uses the trusty little Z88 from Cambridge Computers as a

transporting medium (don't forget it has *Pipedream* resident), it is possible to take data from a Beeb, for example, and squirt it directly into an Archimedes (or a Nimbus, an IBM or an Apple Macintosh for that matter). No other database format gives the user so much flexibility with such simplicity.

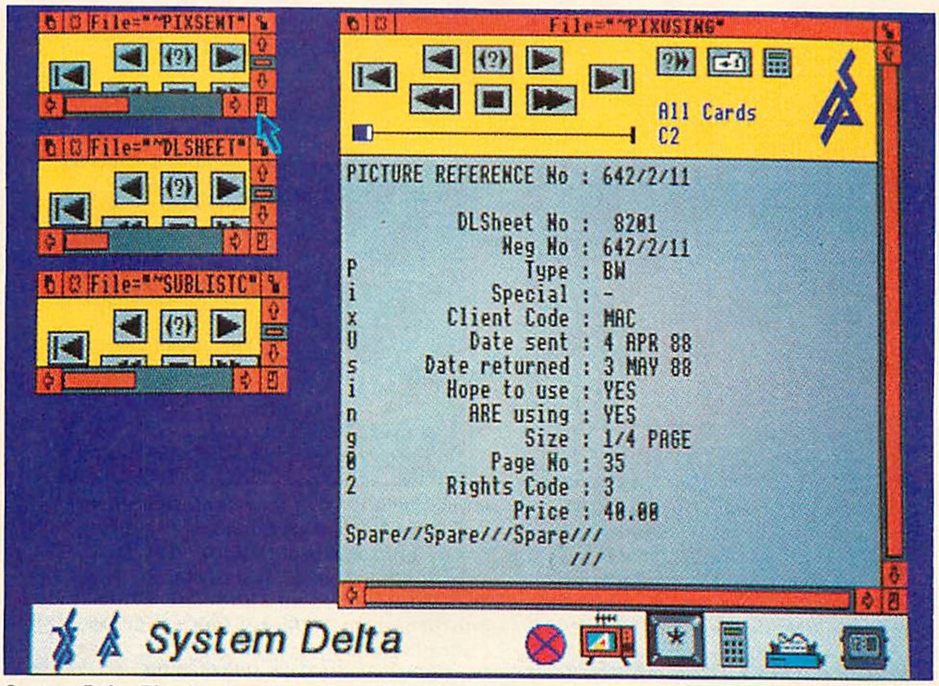
So you already have another datafile in an alien format and you want to convert it. How should you best go about it? Generally speaking, interacting directly with the datafile itself is not a good idea. Some have peculiar control characters throughout them, others do not separate their fields or records at all since they are of a fixed length. This has the effect of making them effectively unreadable in a wordprocessor. However, most database systems have an Ascii output or they may have an output to wordprocessor file.

Do your selection and sorting beforehand unless it is going to be cumbersome, squirt the text out into a file and then load it into *View*. You will need to use the Read rather than the Load command for this operation. It is then a question of finding the appropriate format for your system to read.

You may find that the text version has been sent out with spaces where Tabs should be in the records and that all the lines run into one another. Unfortunately there is no alternative here but to sit down and manually separate the lines into records. Then you can use the search and replace facility to change all relevant spaces to Tab and the file will readily convert into the *ViewStore* format and away you go!

Some systems are sensible enough to allow an Ascii format to be squirted in as if it were being entered from the keyboard. This 'Execing in' of data is supported by *Key* and *System Delta Plus* on the Archimedes (which, incidentally has a wide range of import formats). However, beware! These facilities are susceptible to all sorts of problems. The *System Delta Plus* importer allows you to see the data being 'typed in' so that when a field entry goes out of sequence it is possible to stop the process. *Key* on the other hand does not offer such refinements. If it goes wrong you know either as soon as it starts or not until the end – a process that can take hours.

As well as importing Ascii *Key* will also import from *ViewStore*, and *Quest*. All its imports are blind so you can never be sure how successful they are until they



System Delta Plus has a wide variety of import formats

System	Viewstore	Key	Grass	Supastore	Find	Quest
Import Utility	Yes (View)	Yes (QAF)	Yes (Q)	Yes (QVG)	Yes (Q)	No
Max record size	60,706	Disc	255	3000	2000	4096
Max fields	254	32	18	250	32	20
Field length	239	500	60	255	255	31
Field separator	&09 Tab	-	-	-	-	&7C
Record separator	&OD Ret	-	-	-	-	-
End of file	&01	-	-	-	-	-
Indexes?	Yes	No	No	No	No	No
Macros?	Yes	No	No	No	Yes	Yes
Reports?	Yes	No	No	Yes	No	Yes
Rebuild?	Yes	Yes	No	Yes	No	No
Repeat entry?	No	Yes	No	No	No	No
Links out?	Yes (View)	Yes (Ascii/FIF)	Yes (Quest/ Hop)	Yes (Ascii)	No	No
Tokenised fields	No	Yes	No	No	No	No
Graphing inbuilt	No	Yes	Yes	No	Yes	Yes
Comments						Records reversed

Refer to this table for details on what each database does

have finished. Nonetheless, they function fairly efficiently *Supastore* will import from *ViewStore*, *Grass* and *Quest* but not Ascii directly. You should use your wordprocessor to make your file look like a *ViewStore* file.

Find will import *Quest* and *Factfile* datafiles. In which case it should be possible to transmit from anything that will convert to *Quest*.

Grass will import and export *Quest* format files so it will talk to everything that talks to *Quest*, whereas *Quest* will only export to other versions of itself. Its data is stored in reverse order which makes interaction with it confusing.

You might ask why is life so complicated in the first place? There was an attempt to provide a standard interchange format for all datafiles. This was called File Interchange Format and was developed by the MEP Software Unit at Homerton College. It never really took off because it was still very technical.

In practice, few companies took it on board. Now MESU and NCET together have developed an intelligent file convertor which takes your file, reads it, converts and transmits it without you having to press a key. This will be available shortly from MESU once a few additional features have been added.

This will make life easier but will take all the fun out of sending datafiles through the variety of mincing machines that import your valuable data!

YELLOW PAGES

COMPATIBILITY

Program	Page	BBC B	B+/128	Master 128	Master Compact	Electron	Arc	6502SP/ Turbo	ADFS	Econet	Shadow RAM	Monthly Disc
Hints & Tips	24											
Listings 1-2		■	■	■	■	■	■	■	■	■	■	■
Listing 3(1)		■	■	■	■	■	■(2)	■	■	■	■	■
Arc Agora	30											
Listings 1-3							■		■	■	■	■
Joe's Jottings	65											
Listing 1				■	■		■(2)	■	■	■	■	■
PostScript	72											
Listing 1		■	■	■	■	■	■	■	■	■	■	■
Standing Variables	80											
Listings 1-3		■	■	■	■	■		■	■		■	■

Note
1. Requires Interword ROM.
2. Requires 65EMU.

HINTS & TIPS

See Hints & Tips, page 24

Listing 1. 9-pin justified and proportional text

```
   10 REM Proportional printing program
   20 REM by David Atherton
   30 REM for B/B+/E/M/C/A
   40 REM (c) BAU June 1989
   50 :
   60 CLOSE# 0
   70 DIM width% 94,paragraph% 2000
   80 RESTORE 1190
   90 FOR I%=0 TO 94
  100 READ width%?I%
  110 NEXT
  120 PRINT "ACORN USER Justify/Proportional print routine"
  130 REPEAT
  140 INPUT "Text filename to print : " name$
  150 C%=OPENIN name$
  160 IF C% ELSE PRINT"File not found - try again"
  170 UNTIL C%
  180 INPUT "Lines per page (0=cont): " lpp%
  190 INPUT "Left margin            : " lm%
  200 INPUT "Monospaced width       : " mw%
  210 mw%=mw%*12
  220 PRINT "Turn printer on and press SPACE"
  230 REPEAT UNTIL GET=32
  240 VDU 2,1,27,1,ASC "p",1,1,3
  250 spcwid%=12
  260 minspc%=6
  270 line%=0
  280 frac=0
  290 :
  300 REPEAT
  310 PROCgetpara
  320 ptr%=0
  330 full%=FALSE
  340 :
  350 REPEAT
  360 oldptr%=ptr%
  370 PROCgetline
  380 VDU 2
  390 PRINT STRING$(lm%,CHR$1+CHR$32);
  400 VDU 3
  410 PROCprintline(oldptr%,ptr%-1,wid%,sp%)
  420 UNTIL full%=TRUE
  430 UNTIL EOF#C%
  440 CLOSE# C%
  450 END
  460 :
  470 DEFPROCgetline
  480 LOCAL ch%,sptr%,swid%
  490 wid%=0:sp%=0
  500 REPEAT
  510 ch%=paragraph%?ptr%
  520 IF ch%=32 sp%=sp%+1:sptr%=ptr%:swid%=wid%
  530 wid%=wid%+FNwidth(ch%)
  540 ptr%=ptr%+1
  550 UNTIL ch%=13 OR ((wid%+sp%*spcwid%) > mw%)
  560 full%=(ch%=13)
  570 IF full% THEN 660
  580 :
  590 REPEAT
  600 ch%=paragraph%?ptr%
  610 wid%=wid%+FNwidth(ch%)
  620 ptr%=ptr%+1
  630 UNTIL ch%=32 OR ch%=13
  640 IF ch%=13 THEN full%=TRUE ELSE full%=FALSE
  650 :
  660 IF (wid%+sp%*minspc%)<=mw% THEN ENDPROC
  670 ptr%=sptr%+1
  680 wid%=swid%
```

Continued ▶

◀ Hints & Tips Listing 1 continued

```
 690 sp%=sp%-1
 700 ENDPROC
 710 :
 720 DEF PROCprintline(start%,end%,wid%
,spaces%)
 730 LOCAL i%,ch%
 740 IF full% THEN newspcwid%=spcwid%:G
OTO 790
 750 frac=(mw%-wid%)/spaces%
 760 newspcwid%=INT(frac)
 770 frac=(frac-newspcwid%)*spaces%
 780 fcount%=0
 790 FOR i%=start% TO end%-1
 800 ch%=paragraph%?i%
 810 IF ch%=32 THEN fcount%=fcount%+1:P
ROCspace(newspcwid%) ELSE VDU 2,ch%,3
 820 NEXT
 830 VDU 2:PRINT:VDU 3
 840 IF lpp% THEN PROClinecount
 850 ENDPROC
 860 :
 870 DEF PROCspace(n%)
 880 LOCAL i%
 890 IF fcount% < frac THEN n%=n%+1
 900 VDU 2,1,27,1,ASC"L",1,n% MOD 256,1
,n% DIV 256,3
 910 FOR i%=1 TO n%
 920 VDU 2,1,0,3
 930 NEXT
 940 VDU 32
 950 ENDPROC
 960 :
 970 DEF PROCgetpara
 980 LOCAL ch%,ptr%
 990 REPEAT
 1000 ch%=BGET#C%
 1010 ?(paragraph%+ptr%)=ch%
 1020 ptr%=ptr%+1
 1030 UNTIL ch%=13 OR ch%=254
 1040 ENDPROC
 1050 :
 1060 DEF PROClinecount
 1070 line%=line%+1
 1080 IF line%<lpp% THEN ENDPROC
 1090 line%=0
 1100 VDU 2,1,12,3
 1110 PRINT STRING$(mw% DIV 12,"-")
 1120 ENDPROC
 1130 :
 1140 DEF FNwidth(C%)
 1150 IF C%<32 OR C%>126 THEN C%=32
 1160 =?(width%+C%-32)
 1170 :
 1180 REM Width data for characters (Sta
r NL10)
 1190 DATA 0,5,8,12,12,12,12,6,6,6,10,12
,6,12,6,10
 1200 DATA 12,8,12,12,12,12,12,12,12,12,
6,6,10,12,10,12,12
 1210 DATA 12,12,12,12,12,12,12,12,8,11,
12,12,12,12,12
 1220 DATA 12,12,12,12,12,12,12,12,10,12
,10
 1230 DATA 8,10,8,12,12,6
 1240 DATA 12,11,11,11,12,10,11,11,8,10,
10,8
 1250 DATA 12,11,12,11,11,11,12,11,12,12
,12,10,12,10
 1260 DATA 9,5,9,12
```

Listing 2. View to Wordwise

```
 10 REM Convert View to Wordwise
 20 REM by David Atherton
 30 REM for B/B+/E/M/C/A
 40 REM (c) BAU June 1989
 50 :
 60 CLOSE# 0
 70 INPUT "Name of View file      : "
v$
 80 INPUT "Name for Wordwise file : "
w$
 90 IF w$="" THEN w$="W."+v$
 100 viewfile%=OPENIN v$
 110 wisefile%=OPENOUT w$
 120 ch%=BGET# viewfile%
 130 REPEAT
 140 nxt%=BGET# viewfile%
 150 IF ch%=13 THEN PROCendpara(nxt%=13
)
 160 BPUT# wisefile%,ch%
 170 VDU ch%
 180 IF ch%=13 THEN VDU 10
 190 ch%=nxt%
 200 UNTIL EOF# viewfile%
 210 BPUT# wisefile%,ch%
 220 CLOSE# viewfile%
 230 CLOSE# wisefile%
 240 PRINT "Conversion complete"
 250 END
 260 :
 270 DEF PROCendpara(true%)
 280 IF NOT true% THEN ch%=32:ENDPROC
 290 BPUT# wisefile%,ch%
 300 BPUT# wisefile%,nxt%
 310 ch%=BGET# viewfile%
 320 nxt%=BGET# viewfile%
 330 PRINT:PRINT
 340 ENDPROC
```

Listing 3. Overtype in Interword

```
 10 REM Interword Over
type
 20 REM by Isaac Hepwo
rth
 30 REM for B/B+/M/C/A
 (with 65emu)
 40 REM (c) BAU June 1
989
 50 :
 60 code=&900
 70 flag=&9FF
 80 insert=ASC "C" - 6
4
 90 overtype=ASC "O" -
 64
 100 FOR pass=0 TO 3 ST
EP 3
 110 P%=code
 120 [OPT pass
 130 SEI
 140 LDA #patch MOD 256
 150 STA &220
 160 LDA #patch DIV 256
 170 STA &221
 180 CLI
 190 LDA #&0E
 200 LDX #2
 210 JSR &FFF4
 220 LDA #0
 230 STA flag
 240 .finish
 250 RTS
 260 .patch
```

Continued ▶

◀ Hints & Tips Listing 3 continued

```
270 CMP #2
280 BNE finish
290 PHP
300 PHA
310 TXA
320 PHA
330 TYA
340 PHA
350 CPY #insert
360 BEQ unset
370 CPY #overtype
380 BEQ set
390 LDA flag
400 BMI over
410 JMP pull
420 .over
430 TYA
440 SEC
450 SBC #&20
460 BCC pull
470 SBC #&5F
480 BCS pull
490 LDA #&8A
500 LDX #0
510 JSR &FFF4
520 LDA #&8A
530 LDX #0
540 LDY #&8B
550 JSR &FFF4
560 .pull
570 PLA
580 TAY
590 PLA
600 TAX
610 PLA
620 PLP
630 RTS
640 .set
650 LDA #&FF
660 STA flag
670 JMP pull
680 .unset
690 LDA #0
700 STA flag
710 JMP pull
720 ]:NEXT
730 com$="*SAVE OTYPE
900+"+STR$~(P%-&900)
740 PRINT "Press S to
: " com$
750 G%=GET AND &DF
760 IF G%=ASC"S" THEN
PROCoscli(com$)
770 END
780 :
790 DEF PROCoscli($&70
0)
800 LOCAL X%,Y%
810 Y%=7
820 CALL &FFF7
830 ENDPROC
```

See Arc Agora, page 30

Listing 1. Joystick Emulator

```
10 REM Agora - listing 1
20 REM Archimedes Joystick Emulator
30 REM by Richard Averill
40 REM for Archimedes only
50 REM (c) BAU June 1989
60 :
70 DIM code% 2000
80 XWriteI%=&20100
90 FOR opt%=4 TO 6 STEP 2
100 P%=0
110 O%=code%
120 [OPT opt%
130 EQUD 0
140 EQUD ptrinit
150 EQUD 0
160 EQUD ptrservice
170 EQUD strtitle
180 EQUD strhelp
190 EQUD tblcommands
200 EQUS STRING$(20,CHR$(0))
210 :
220 .strtitle
230 FNstr("PseudoJoystick")
240 :
250 .strhelp
260 FNstr("PseudoJoystick"+CHR$(9)+"1.
00 ("+MID$(TIME$,5,11)+") by Richard Ave
rill")
270 :
280 .ptrinit
290 STMFD R13!,{R0,R14}
300 SWI "XOS_WriteS"
310 FNstr("Pseudo-Joystick v1.00 by Ri
chard Averill, December 1988."+CHR$(13)+
CHR$(10))
320 MOV R0,#2
330 STR R0,[R12]
340 LDMFD R13!,{R0,PC}^
350 :
360 .ptrservice
370 LDR R12,[R12]
380 CMP R12,#0
390 MOVEQ PC,R14
400 CMP R1,#7
410 MOVNE PC,R14
420 CMP R2,#16
430 CMPNE R2,#17
440 MOVEQ R1,#0
450 CMP R2,#188
460 MOVEQ R1,#0
470 MOVEQ R3,#1
480 CMP R2,#189
490 MOVEQ R1,#0
500 MOVEQ R3,#4
510 CMP R2,#190
520 MOVEQ R1,#0
530 MOVEQ R3,#12
540 CMP R2,#128
550 MOVNE PC,R14
560 CMP R3,#0
570 MOVMI PC,R14
580 CMP R3,#5
590 MOVPL PC,R14
600 STMFD R13!,{R5-R9,14}
610 STMFD R13!,{R0-R3}
620 MOV R0,#21
630 MOV R1,#9
640 SWI "XOS_Byte"
650 SWI "XOS_Mouse"
660 MOV R9,R2
670 MOV R8,R1
680 MOV R7,R0
690 LDMFD R13!,{R0-R3}
700 BL dojump
710 MOV R4,R3,LSR #8
720 MOV R1,#0
730 LDMFD R13!,{R5-R9,PC}^
740 :
750 .dojump
760 ADR R5,tbljump
770 ADD PC,R5,R3,LSL #2
780 :
790 .tbljump
800 B fires
810 B xstick
820 B ystick
830 B xstick
840 B ystick
850 :
860 .fires
870 AND R3,R9,#%100
880 AND R5,R9,#1
890 MOV R3,R3,LSR #2
900 MOV R5,R5,LSL #1
910 ORR R3,R3,R5
920 MOV PC,R14
```

Continued ▶

◀ **Arc Agora Listing 1 continued**

```
930 :
940 .xstick
950 MOV R5,#1280
960 SUB R5,R5,R7
970 MOV R6,#51
980 MUL R3,R5,R6
990 B checkdigital
1000 :
1010 .ystick
1020 MOV R5,#64
1030 MUL R3,R5,R8
1040 B checkdigital
1050 :
1060 .checkdigital
1070 CMP R12,#1
1080 MOVNE PC,R14
1090 CMP R3,#&8000
1100 MOVLT R3,#0
1110 CMP R3,#&8000
1120 MOVGT R3,#&10000
1130 SUBGT R3,R3,#15
1140 MOV PC,R14
1150 :
1160 .setdigital
1170 MOV R0,#1
1180 STR R0,[R12]
1190 MOVS PC,R14
1200 :
1210 .setanalogue
1220 MOV R0,#2
1230 STR R0,[R12]
1240 MOVS PC,R14
1250 :
1260 .nojoystick
1270 MOV R0,#0
1280 STR R0,[R12]
1290 MOVS PC,R14
1300 :
1310 .joystickinfo
1320 STMFD R13!,{R0,R14}
1330 SWI "XOS_WriteS"
1340 EQUS "Joystick Emulation module. W
ritten by Richard Averill."
1350 EQUW &0D0A
1360 FNstr("Current joystick emulation:
")
1370 LDR R12,[R12]
1380 CMP R12,#0
1390 ADREQ R0,infonone
1400 CMP R12,#1
1410 ADREQ R0,infodigital
1420 CMP R12,#2
1430 ADREQ R0,infoanalogue
1440 SWI "XOS_Write0"
1450 SWI "XOS_NewLine"
1460 LDMFD R13!,{R0,PC}^
1470 :
1480 .infonone
1490 FNstr("none (emulation is off).")
1500 .infodigital
1510 FNstr("BBC digital.")
1520 .infoanalogue
1530 FNstr("BBC proportional (analogue)
.")
1540 :
1550 .joystickspeed
1560 STMFD R13!,{R14}
1570 BL ptrsetspeed
1580 LDMFD R13!,{PC}
1590 :
1600 .ptrsetspeed
1610 STMFD R13!,{R14}
1620 CMP R1,#0
1630 MOVEQ R1,#2
1640 BEQ ptroswordspeed
1650 LDRB R0,[R0]
1660 CMP R0,#ASC"0"
1670 MOVLE R0,#2
1680 CMP R0,#ASC"9"
1690 MOVGT R0,#2
1700 SUB R1,R0,#ASC"0"
1710 .ptroswordspeed
1720 STMFD R13!,{R0,R1,R2,R14}
1730 MOV R0,#2
1740 ADD R0,R0,R1,LSL #8
1750 ADD R0,R0,R1,LSL #16
1760 STMFD R13!,{R0} ; pass parameter b
lock through stack.
1770 MOV R1,R13
1780 MOV R0,#&15
1790 SWI "XOS_Word"
1800 LDMFD R13!,{R0}
1810 LDMFD R13!,{R0,R1,R2,PC}
1820 :
1830 .tblcommands
1840 FNstr("JoystickDigital")
1850 EQUD setdigital
1860 EQUD 0
1870 EQUD syndigital
1880 EQUD hlpdigital
1890 FNstr("JoystickAnalogue")
1900 EQUD setanalogue
1910 EQUD 0
1920 EQUD synanalogue
1930 EQUD hlpanalogue
1940 FNstr("JoystickOff")
1950 EQUD nojoystick
1960 EQUD 0
1970 EQUD synnojoystick
1980 EQUD hlpnojoystick
1990 FNstr("JoystickInfo")
2000 EQUD joystickinfo
2010 EQUD 0
2020 EQUD synjoystickinfo
2030 EQUD hlpjoystickinfo
2040 FNstr("JoystickSpeed")
2050 EQUD joystickspeed
2060 EQUD &10000
2070 EQUD synjoystickspeed
2080 EQUD hlpjoystickspeed
2090 EQUD 0
2100 :
2110 .hlpdigital
2120 EQUS "*JoystickDigital enables emu
lation of a digital joystick."
2130 EQUW &0D0A
2140 .syndigital
2150 FNstr("Syntax: *JoystickDigital")
2160 .hlpanalogue
2170 EQUS "*JoystickAnalogue enables em
ulation of an analogue joystick."
2180 EQUW &0D0A
2190 .synanalogue
2200 FNstr("Syntax: *JoystickAnalogue")
2210 .hlpnojoystick
2220 EQUS "*JoystickOff disables joysti
ck emulation by this module."
2230 EQUW &0D0A
2240 .synnojoystick
2250 FNstr("Syntax: *JoystickOff")
2260 .hlpjoystickinfo
2270 EQUS "*JoystickInfo gives details
of current joystick emulation."
2280 EQUW &0D0A
2290 .synjoystickinfo
2300 FNstr("Syntax: *JoystickInfo")
2310 .hlpjoystickspeed
```

Continued ▶

◀ Arc Agora Listing 1 continued

```
 2320 EQUS "*JoystickSpeed sets the mult
iplication factor of the joystick positi
ons (the default value is 1 - range 1 to
 9)."
 2330 EQUW &0D0A
 2340 .synjoystickspeed
 2350 FNstr("Syntax: *JoystickSpeed [<sp
eed>]")
 2360 ]
 2370 NEXT opt%
 2380 SYS "OS_File",&0A,"JSEmulator",&FF
A,,code%,0%
 2390 PRINT "Module saved as 'JSEmulator
'"
 2400 END
 2410 :
 2420 DEF FNstr(str$)
 2430 [OPT opt% AND &E
 2440 EQUS str$+CHR$(0)
 2450 ALIGN
 2460 ]
 2470 =opt%
```

Listing 2. Joystick Tester

```
   10 REM Agora - listing 2
   20 REM Archimedes Joystick Emulator t
ester
   30 REM by Richard Averill
   40 REM for Archimedes only
   50 REM (c) Richard Averill, 1988.
   60 :
   70 MODE 0
   80 OFF
   90 PROCsetup
  100 REPEAT
  110 PROCgetpos
  120 IF but%<>2 change%=TRUE
  130 IF but%=2 AND change% THEN
  140 change%=FALSE
  150 CASE emul% OF
  160 WHEN 1:emul$=" (Analogue)":emul%=2
:*JoystickAnalogue
  170 WHEN 2:emul$=" (Digital) ":emul%=1
:*JoystickDigital
  180 ENDCASE
  190 ENDIF
  200 IF but%<>obut% OR but%>0 THEN PRIN
T TAB(0,3) "Buttons :";but%;emul$
  210 PROCpointer
  220 IF but%=1 THEN LINE ojsx%,ojsy%,js
x%,jsy%
  230 obut%=but%
  240 ojsx%=jsx%
  250 ojsy%=jsy%
  260 UNTIL FALSE
  270 :
  280 DEF PROCpointer
  290 GCOL 3,15
  300 PROChairs(jsx%,jsy%)
  310 WAIT
  320 WAIT
  330 PROChairs(jsx%,jsy%)
  340 ENDPROC
  350 :
  360 DEF PROChairs(x%,y%)
  370 CIRCLE x%,y%,128
  380 CIRCLE x%,y%,138
  390 LINE x%-96,y%,x%+96,y%
  400 LINE x%,y%-96,x%,y%+96
  410 ENDPROC
  420 :
  430 DEF PROCgetpos
  440 jsx%=1279-(ADVAL(1)/51.2)
  450 jsy%=ADVAL(2) DIV 64
  460 but%=ADVAL(0)
  470 ENDPROC
  480 :
  490 DEF PROCsetup
  500 *RMLoad JSEmulator
  510 *POINTER
  520 MOUSE ON 1
  530 MOUSE TO 640,512
  540 MOUSE COLOUR 1,&F0,&F0,&F0
  550 MOUSE COLOUR 2,&00,&00,&00
  560 ojsx%=640
  570 ojsy%=512
  580 obut%=-1
  590 emul$=" (Analogue)"
  600 emul%=2
  610 *JoystickSpeed 2
  620 *JoystickAnalogue
  630 change%=TRUE
  640 ENDPROC
```

Listing 3. Multi-column listings

```
   10 REM Agora - listing 3
   20 REM MPlist/MPblist source
   30 REM by Dave Acton
   40 REM for Archimedes only
   50 REM (c) BAU June 1989
   60 :
   70 columns%=3
   80 topmargin%=4
   90 guttersize%=3
  100 colwidth%=(120-(columns%-1)*gutter
size%) DIV columns%
  110 linesperpage%=58
  120 lastline%=linesperpage%*columns%
  130 s%=(columns%*colwidth%*linesperpag
e%+&FF) AND &FF00
  140 vbit=1<<28
  150 DIM code% &1000
  160 PROCass("MPlist",FALSE)
  170 PROCass("MPblist",TRUE)
  180 END
  190 :
  200 DEF PROCass(u$,balflag%)
  210 subline=2
  220 line=3
  230 xpos=4
  240 bufbase=5
  250 filehand=6
  260 count=7
  270 base=8
  280 count2=9
  290 temp=10
  300 temp2=11
  310 last=12
  320 sp=13:link=14:pc=15
  330 FOR pass%=4 TO 6 STEP 2
  340 P%=0:O%=code%
  350 [OPT pass%
  360 .mplist
  370 STMFD (sp)!,{link}
  380 MOV R0,#&40
```

Continued ▶

◀ Arc Agora Listing 3 continued

```
390 SWIS "XOS_Find"
400 LDMVSFD (sp)!,{pc}
410 CMP R0,#0
420 ADREQ R0,nosuchfile
430 LDMEQFD (sp)!,{link}
440 ORREQS pc,link,#vbit
450 MOV filehand,R0
460 ADR bufbase,buffer
470 SWI &100+2
480 SWI &100+1
490 SWI &100+27
500 SWI &100+1
510 SWI &100+15
520 BL clearpage
530 .mplistloop
540 MOV R1,filehand
550 SWI "OS_BGet"
560 BCS donefile
570 CMP R0,#13
580 BNE notret
590 .isret
600 BL doret
610 B mplistloop
620 .notret
630 CMP R0,#32
640 BLT mplistloop
650 CMP R0,#127
660 BGE mplistloop
670 CMP xpos,#colwidth%
680 BLEQ doret
690 MOV temp,#colwidth%
700 MLA temp2,temp,line,xpos
710 STRB R0,[bufbase,temp2]
720 ADD xpos,xpos,#1
730 B mplistloop
740 .donefile
750 CMP xpos,#0
760 CMPEQ line,#0
770 BLNE sendpage
780 SWI &100+1
790 SWI &100+27
800 SWI &100+1
810 SWI &100+18
820 SWI &100+3
830 MOV R0,#0
840 MOV R1,filehand
850 SWI "OS_Find"
860 LDMFD (sp)!,{pc}
870 :
880 .nosuchfile
890 EQUD 214
900 EQUS "No such file"
910 EQUB 0
920 ALIGN
930 :
940 .doret
950 MOV xpos,#0
960 ADD line,line,#1
970 CMP line,#lastline%
980 MOVNE pc,link
990 .sendpage
1000 STMFD (sp)!,{R0,link}
1010 ]
1020 IF NOT balflag% [OPT pass%:MOV lin
e,#lastline%:]
1030 [OPT pass%
1040 ADD line,line,#columns%-1
1050 MOV last,#0
1060 .divide
1070 SUBS line,line,#columns%
1080 ADDPL last,last,#1
1090 BPL divide
1100 MOV count,#topmargin%
1110 .dotopmarg
1120 BL crlf
1130 SUBS count,count,#1
1140 BNE dotopmarg
1150 MOV line,#0
1160 .sendloop0
1170 MOV subline,line
1180 MOV count2,#columns%
1190 .sendloop1
1200 MOV xpos,#0
1210 .sendloop2
1220 MOV temp,#colwidth%
1230 MLA temp2,temp,subline,xpos
1240 SWI &100+1
1250 LDRB R0,[bufbase,temp2]
1260 SWI "OS_WriteC"
1270 ADD xpos,xpos,#1
1280 CMP xpos,#colwidth%
1290 BNE sendloop2
1300 CMP count2,#1
1310 BEQ nogutter
1320 MOV count,#guttersize%
1330 .dogutter
1340 SWI &100+1
1350 SWI &100+32
1360 SUBS count,count,#1
1370 BNE dogutter
1380 .nogutter
1390 ADD subline,subline,last
1400 SUBS count2,count2,#1
1410 BNE sendloop1
1420 BL crlf
1430 ADD line,line,#1
1440 CMP line,last
1450 BLT sendloop0
1460 SWI &100+1
1470 SWI &100+12
1480 BL clearpage
1490 LDMFD (sp)!,{R0,pc}
1500 :
1510 .crlf
1520 STMFD (sp)!,{link}
1530 SWI &100+1
1540 SWI &100+13
1550 SWI &100+1
1560 SWI &100+10
1570 LDMFD (sp)!,{pc}
1580 :
1590 .clearpage
1600 MOV xpos,#0
1610 MOV line,#0
1620 MOV count,#s%
1630 MOV temp,#32
1640 .clearpageloop
1650 SUBS count,count,#1
1660 MOVMI pc,link
1670 STRB temp,[bufbase,count]
1680 B clearpageloop
1690 ]
1700 buffer=P%
1710 O%+=s%
1720 NEXT pass%
1730 SYS "OS_File",10,u$,&FFC,,code%,O%
1740 PRINT"Utility '"u$"' saved"
1750 ENDPROC
```

An enhanced version of listing 3 is included on this month's disc. It supports a variety of extra features, including the printing out of spooled files across two to five columns and in several styles of print. Individual variables (such as page length, number of columns etc) may be specified.

JOE'S JOTTINGS

See Joe's Jottings, page 65

Listing 1. Billing

```
   10 REM Monthly Billing
   20 REM by Joe Telford
   30 REM for M/C
   40 REM (c) BAU June 1989
   50 :
   60 MODE 129
   70 ptr=0:col=0:m=1:z%=&90A
   80 PROCsetup
   90 ON ERROR PROCerr
  100 REPEAT
  110 PROCscreen(0)
  120 IF erflag<>2 THEN choice=FNchoose(
0)
  130 erflag=0
  140 IF choice=1 THEN PROCfiles
  150 IF choice=2 THEN PROCedit
  160 IF choice=3 THEN PROCcostcop
  170 IF choice=4 THEN PROCdisplay
  180 IF choice=5 THEN RUN
  190 UNTIL choice=6
  200 MODE 7
  210 END
  220 :
  230 DEF PROCcat
  240 CLS
  250 *CAT
  260 PRINTTAB(0,0);STRING$(120," ")
  270 PROCdh("Press SPACE to return.",7,
0)
  280 REPEAT UNTIL GET =32
  290 ENDPROC
  300 :
  310 DEF PROCload
  320 REPEAT
  330 PROCscreen(0)
  340 PROCdh("Open a Billing File",11,6)
  350 PROCfilebody
  360 UNTIL F$>""
  370 ch%=OPENUP F$
  380 IF ch%=0 THEN PROCscreen(0):PROCdh
("Open a Billing File",11,6):PROCdh(F$+"
 is not on this disc",6,10):VDU 7:A=INKE
Y(300):ENDPROC
  390 T%=BGET# ch%
  400 IF T%<>ASC"B":CLOSE# ch%:PROCscree
n(0):PROCdh("Open a Billing File",11,6):
PROCdh(F$+" is not a billing file",6,10)
:VDU 7:A=INKEY(300):ENDPROC
  410 INPUT# ch%,S$,hd,ca,cost
  420 FOR hdng%=1 TO hd
  430 INPUT# ch%,S$(hdng%)
  440 FOR categ%=1 TO ca
  450 FOR info%= 0 TO 2
  460 INPUT# ch%,Q(hdng%,categ%,info%)
  470 NEXT:NEXT:NEXT
  480 CLOSE# ch%
  490 ENDPROC
  500 :
  510 DEF PROCdelf
  520 REPEAT
  530 PROCscreen(0)
  540 PROCdh("Delete a File",14,6)
  550 PROCfilebody
  560 UNTIL F$>""
  570 ch%=OPENUP F$:CLOSE# ch%
  580 IF ch%=0 THEN PROCscreen(0):PROCdh
("Delete a File",14,6):PROCdh(F$+" is no
t on this disc",6,10):VDU 7:A=INKEY(300)
:ENDPROC
  590 OSCLI("DELETE "+F$)
  600 ENDPROC
  610 :
  620 DEF PROCsave
  630 REPEAT
  640 PROCscreen(0)
  650 PROCdh("Save a billing File",11,6)
  660 PROCfilebody
  670 UNTIL F$>""
  680 ch%=OPENUP F$:CLOSE# ch%
  690 IF ch%<>0 THEN PROCscreen(0):PROCd
h("Save a Billing File",11,6):PROCdh(F$+
" already used on this disc",3,10):VDU 7
:A=INKEY(300):ENDPROC
  700 ch%=OPENOUT F$
  710 BPUT# ch%,ASC("B")
  720 PRINT# ch%,S$,hd,ca,cost
  730 FOR hdng%=1 TO hd
  740 PRINT# ch%,S$(hdng%)
  750 FOR categ%=1 TO ca
  760 FOR info%=0 TO 2
  770 PRINT# ch%,Q(hdng%,categ%,info%)
  780 NEXT:NEXT:NEXT
  790 CLOSE # ch%
  800 ENDPROC
  810 :
  820 DEF PROCpdraft
  830 PROCscreen(0)
  840 PROCdh("To print a draft copy -",9
,6)
  850 PROCdh("Setup your printer",11,10)
  860 PROCdh("then press RETURN!",11,14)
  870 REPEAT UNTIL GET=13
  880 *FX 3,10
  890 PRINT "Monthly Accounts: ";S$'
  900 FOR hdng%=1 TO hd
  910 PRINT 'S$(hdng%)
  920 FOR categ%=1 TO ca
  930 PRINTTAB(10);Q$(categ%),;
  940 PRINT Q(hdng%,categ%,0),Q(hdng%,ca
teg%,1),Q(hdng%,categ%,2)
  950 NEXT:NEXT
  960 *FX 3,0
  970 ENDPROC
  980 :
  990 DEF PROCfilebody
 1000 PROCdh("Please type the billing fi
le-name,",2,10)
 1010 PROCdh("Or press RETURN alone for
catalogue",2,18)
 1020 F$=FNgpi(7,0,cap$+low$+nos$+".$",1
7,14,1)
 1030 IF F$="" THEN PROCcat
 1040 ENDPROC
 1050 :
 1060 DEF PROCname
 1070 PROCscreen(0)
 1080 PROCdh("This billing file is calle
d...",2,8)
 1090 REPEAT S$=FNgpi(38,0,all$,1,12,1)
 1100 UNTIL S$>" "
 1110 ENDPROC
 1120 :
 1130 DEF PROCheadings(n)
 1140 PROCscreen(0)
 1150 IF n=0 PROCdh("Departments.",12,3)
 1160 IF n=1 PROCdh("First select a Dept
.",9,3)
 1170 PROCpsections
 1180 erflag=2
 1190 *FX 4,1
 1200 ptr=1:REPEAT
 1210 REPEAT PROChhead
 1220 A=GET
 1230 IF A=138 THEN ptr=ptr+1:PROChhead
 1240 IF A=139 THEN ptr=ptr-1:PROChhead
 1250 UNTIL A=9
 1260 IF n=1 THEN UNTIL TRUE:ENDPROC
```

Continued ▶

YELLOW PAGES

JOE'S JOTTINGS

◀ **Joe's Jottings, continued**

```
1270 S$(ptr)=FNgpi(15,0,all$,16,ptr+5,0
)
1280 UNTIL 0
1290 ENDPROC
1300 :
1310 DEF PROChhead
1320 IF ptr<1 ptr=1
1330 IF ptr>hd ptr=hd
1340 LOCAL loop%
1350 FOR loop%= 1 TO hd
1360 IF ptr=loop% THEN COLOUR 131:COLOU
R 0:ELSE COLOUR 128:COLOUR 3
1370 PRINTTAB(16,loop%+5);S$(loop%);STR
ING$(15-LENS$(loop%),".");
1380 NEXT
1390 ENDPROC
1400 :
1410 DEF PROCpsections
1420 FOR loop%=1 TO hd
1430 PRINTTAB(5,loop%+5);"Dept ";:IFloo
p%<10 THEN PRINT" ";
1440 PRINT;loop%;
1450 NEXT
1460 IF n=0 PRINTTAB(2,28)"^ & v to mov
e - TAB to enter dept."
1470 IF n=0 PROCdh(" Press Escape when
you are finished ",2,30)
1480 IF n=1 PROCdh("   ^ & v to move -
TAB to select    ",2,30)
1490 ENDPROC
1500 :
1510 DEF PROCcategs(m)
1520 PROCheadings(1)
1530 cflag=ptr
1540 PROCscreen(cflag)
1550 PROCpcategs
1560 erflag=2
1570 *FX 4,1
1580 ptr=1:col=1:REPEAT
1590 REPEAT PROChcats
1600 A=GET
1610 IF m=0 THEN IF A=138 THEN ptr=ptr+
1
1620 IF m=0 THEN IF A=139 THEN ptr=ptr-
1
1630 REMIFA=136 THEN col=col-1
1640 REMIFA=137 THEN col=col+1
1650 PROCcheck:PROChcats
1660 UNTIL A=9
1670 IF m=1 THEN UNTILTRUE:erflag=0:END
PROC
1680 IF col=1 THEN Q(cflag,ptr,0)=VAL(F
Ngpi(10,0,nos$,6,ptr+10,0)):Q(cflag,ptr,
1)=Q(cflag,ptr,0)*cost:Q(cflag,ptr,2)=FN
add(1,ptr)
1690 UNTILO
1700 ENDPROC
1710 :
1720 DEF FNadd(s,e)
1730 LOCAL loop%
1740 Q(cflag,e,2)=0
1750 FOR loop%= s TO e
1760 Q(cflag,e,2)=Q(cflag,e,2)+Q(cflag,
loop%,1)
1770 NEXT
1780 =Q(cflag,e,2)
1790 :
1800 DEF PROCcheck
1810 IF col<0 col=0
1820 IF col>1 col=1
1830 IF ptr>ca ptr=ca
1840 IF ptr<1 ptr=1
1850 ENDPROC
1860 :
1870 DEF PROChcats
1880 LOCAL loop%
1890 FOR loop%=1 TO ca
1900 IF ptr=loop% AND col=0 THEN COLOUR
131:COLOUR 0:ELSE COLOUR 128:COLOUR 3
1910 PRINTTAB(2,loop%+10);Q$(loop%);
1920 IF ptr=loop% AND col=1 THEN COLOUR
131:COLOUR 0:ELSE COLOUR 128:COLOUR 3
1930 PRINTTAB(6,loop%+10)Q(cflag,loop%,
0)INT(Q(cflag,loop%,1)+.5)/100INT(Q(cfla
g,loop%,2)+.5)/100
1940 NEXT
1950 ENDPROC
1960 :
1970 DEF PROCpcategs
1980 PRINTTAB(2,7)"Month  Items used  C
ost(`) Totals(`)"
1990 IF m=0 THEN PRINTTAB(8,28)"^ v mov
e - TAB enters data"
2000 IF m=0 THEN PROCdh(" Press Escape
when you are finished ",2,30)
2010 IF m=1 THEN PROCdh(" < > move - TA
B selects sort column ",2,30)
2020 ENDPROC
2030 :
2040 DEF PROCfiles
2050 REPEAT PROCscreen(0):choose=FNchoo
se(1)
2060 IF choose=1 THEN PROCcat
2070 IF choose=2 THEN PROCload
2080 IF choose=3 THEN PROCsave
2090 IF choose=4 THEN PROCdelf
2100 IF choose=5 THEN PROCpdraft
2110 UNTIL choose=6
2120 ENDPROC
2130 :
2140 DEF PROCedit
2150 REPEAT PROCscreen(0):choose=FNchoo
se(2)
2160 IF choose=1 THEN PROCname
2170 IF choose=2 THEN PROCheadings(0)
2180 IF choose=3 THEN PROCcategs(0)
2190 UNTIL choose=4
2200 ENDPROC
2210 :
2220 DEF PROCcostcop
2230 PROCscreen(0)
2240 PROCdh("Cost was "+STR$(cost)+" p
per item ",2,8)
2250 PROCdh("The new cost in p per item
 is....",2,12)
2260 REPEATcost=VAL(FNgpi(10,0,nos$,27,
16,1))
2270 UNTIL cost>0
2280 ENDPROC
2290 :
2300 :
2310 DEF PROCdisplay
2320 REPEAT PROCscreen(0):choose=FNchoo
se(4)
2330 IF choose=1 THEN PROCtable
2340 IF choose=2 THEN PROCpie
2350 IF choose=3 THEN PROCbar
2360 IF choose=4 THEN PROCline
2370 UNTIL choose=5
2380 ENDPROC
2390 :
2400 DEF PROCpie
2410 PROCheadings(1)
2420 section=ptr
2430 erflag=0
2440 VDU 19,0,0;0;
2450 CLS
```

Continued ▶

◀ Joe's Jottings, continued

```
2460 PROCdh(S$(section),20-(LEN(S$(sect
ion))/2),0)
2470 number=FNfindblank
2480 PROCmaxmin
2490 PROCdrawpiechart(section,number,ma
x,min)
2500 PROCbase(1)
2510 ENDPROC
2520 :
2530 DEF PROCbar
2540 PROCheadings(1)
2550 section=ptr
2560 erflag=0
2570 VDU 19,0,0;0;
2580 CLS
2590 PROCdh(S$(section),20-(LEN(S$(sect
ion))/2),0)
2600 number=FNfindblank
2610 PROCmaxmin
2620 PROCdrawbargraf(section,number,max
,min)
2630 PROCbase(1)
2640 ENDPROC
2650 :
2660 DEF PROCline
2670 PROCheadings(1)
2680 section=ptr
2690 erflag=0
2700 VDU 19,0,0;0;
2710 CLS
2720 PROCdh(S$(section),20-(LEN(S$(sect
ion))/2),0)
2730 number=FNfindblank
2740 PROCmaxmin
2750 PROCdrawlinegraf(section,number,ma
x,min)
2760 PROCbase(1)
2770 ENDPROC
2780 :
2790 DEF PROCmaxmin
2800 LOCAL loop%
2810 min=9999999999:max=-9999999999
2820 FOR loop%=1 TO number
2830 IF Q(section,loop%,0)>max THEN max
=Q(section,loop%,0)
2840 IF Q(section,loop%,0)<min THEN min
=Q(section,loop%,0)
2850 NEXT
2860 IF min>0 THEN min=0
2870 IF max<0 THEN max=0
2880 ENDPROC
2890 :
2900 DEF FNfindblank
2910 LOCAL loop%,number
2920 number=0
2930 FOR loop%=1 TO ca
2940 IFQ$(loop%)="" THEN number=loop%:l
oop%=ca
2950 NEXT
2960 number=number-1
2970 IF number=-1 THEN number=ca
2980 =number
2990 :
3000 DEF PROCbase(b)
3010 IF b=0 PROCdh("SPACE-BAR exits / P
 to Print screen.",2,30)
3020 IF b=1 PROCdh(" SPACE-BAR exits /
P to Print screen. ",1,0)
3030 REPEAT A$=GET$:UNTIL A$=" " OR A$=
"P" OR A$="p"
3040 IF A$<>" " THEN PROCdumpout(b)
3050 ENDPROC
3060 :
3070 DEF PROCtable
3080 PROCheadings(1)
3090 cflag=ptr
3100 PROCscreen(cflag)
3110 m=1:PROCpcategs
3120 ptr=0:PROChcats
3130 VDU 19,0,0;0;
3140 erflag=0
3150 PROCbase(0)
3160 ENDPROC
3170 :
3180 DEF PROCerr
3190 *FX 4,0
3200 COLOUR 128:COLOUR 3:*FX 3,0
3210 VDU 3:CLOSE# 0:*FX 15,1
3220 IF ERR=17 THEN ENDPROC
3230 IF ERR=190 OR ERR=198 THEN PROCscr
een(0):PROCdh("This disc is full. Please
 try another.",1,10):VDU 7:A$=INKEY$(300
):ENDPROC
3240 IF ERR=199 THEN PROCscreen(0):PROC
dh("I can't read this disc. Try another.
",1,10):VDU 7:A$=INKEY$(300):ENDPROC
3250 REPORT
3260 PRINT " at line " ERL
3270 END
3280 :
3290 DEF FNchoose(n)
3300 COLOUR 2
3310 LOCAL loop,ch
3320 FOR loop=1 TO M%(n)
3330 PROCdh(STR$loop+". "+M$(n,loop),10
,3+loop*3)
3340 NEXT
3350 PROCdh("Which? ",4,24)
3360 REPEAT
3370 ch=VAL(FNgpi(1,0,nos$,11,24,1))
3380 UNTIL ch>0 AND ch<=M%(n)
3390 COLOUR 3
3400 =ch
3410 :
3420 DEF PROCsetup
3430 hd=20:ca=12
3440 cost = 1
3450 S$="BAU Monthly Accounts"
3460 S%=0
3470 DIM S$(hd)
3480 DIM Q%(ca)
3490 DIM Q$(ca)
3500 DATA Apr,May,Jun,Jul,Aug,Sep,Oct,N
ov,Dec,Jan,Feb,Mar
3510 LOCAL month:RESTORE 3500:FOR month
= 1 TO 12:READ Q$(month):NEXT
3520 DIM Q(hd,ca,2)
3530 J$="Another one of Joe's Jottings"
3540 menus=6
3550 DIM M$(menus,6),M%(menus)
3560 :
3570 DATA 6,Files,Edit,Cost/copy,Displa
y,New,Exit
3580 DATA 6,Catalogue Disc,Open file,Sa
ve File as...,Delete File,Print Draft Co
py,Main Menu
3590 DATA 4,Customise,Department Names,
Enter Copies,Main Menu
3600 DATA 2,New price per copy,Main Men
u
3610 DATA 5,Display Table,Display Pie c
hart,Display Bar Graph,Display Line grap
h,Main Menu
3620 DATA 0,0
3630 :
3640 LOCAL loop,cats
3650 FOR loop=0 TO menus
3660 READ M%(loop)
```

Continued ▶

JOE'S JOTTINGS

◀ Joe's Jottings, continued

```
 3670 IF M%(loop)>0 THEN FOR cats=1 TO M
%(loop):READ M$(loop,cats):NEXT
 3680 NEXT
 3690 PROCvalid
 3700 erflag=0
 3710 ENDPROC
 3720 :
 3730 DEF PROCscreen(n)
 3740 CLS
 3750 VDU 19,0,1;0;
 3760 GCOL 0,3:COLOUR 3
 3770 REMPROCrect(0,32,1278,960,0)
 3780 PROCdh(S$,20-(LEN(S$)/2),0)
 3790 n$=S$(n)+" department ("+STR$(n)+"
)"
 3800 IF n>0 THEN PROCdh(n$,20-(LEN(n$)/
2),2)
 3810 PROCdh(J$,20-(LEN(J$)/2),30)
 3820 PRINTTAB(0,0);
 3830 ENDPROC
 3840 :
 3850 DEF FNgpi(len,effect,valid$,x,y,s)
 3860 LOCAL a$,b
 3870 a$=""
 3880 IF s=0 THEN PRINTTAB(x,y);STRING$(
len,".");:ELSE PROCdh(STRING$(len,"."),x
,y)
 3890 PRINTTAB(x,y);:*FX 15,1
 3900 b=GET:IF b=13 THEN =a$
 3910 IF b=127 AND a$="" THEN 3900
 3920 IF b=127 AND s=1 THEN a$=LEFT$(a$,
LEN(a$)-1):PRINTCHR$(b);:PROCextend("H",
ASC"."):PRINTCHR$(8);:GOTO3900
 3930 IF b=127 AND s=0 THEN a$=LEFT$(a$,
LEN(a$)-1):PRINTCHR$(b);".";CHR$(8);:GOT
O 3900
 3940 IF effect=0 THEN 3970
 3950 IF effect=1 b=b AND 223 ELSE b=b O
R 32
 3960 IF effect=3 AND(RIGHT$(a$,1)=" " O
R a$="") b=b AND 223
 3970 IF LEN(a$)=len OR INSTR(valid$,CHR
$b)=0 VDU 7:GOTO 3900
 3980 IF s=0 THEN VDU b:ELSE PROCextend(
"H",b)
 3990 a$=a$+CHR$(b):GOTO 3900
 4000 :
 4010 DEF PROCvalid
 4020 cap$=" ABCDEFGHIJKLMNOPQRSTUVWXYZ"
 4030 low$=" abcdefghijklmnopqrstuvwxyz"
 4040 nos$="-.0123456789"
 4050 pun$=" !#$%&'()=?/*:+;.,<>"+CHR$34
 4060 all$=cap$+low$+nos$+pun$
 4070 ENDPROC
 4080 :
 4090 DEF PROCrect(x,y,l,w,f)
 4100 MOVE x,y:DRAW x+l,y
 4110 IF f=0 DRAW x+l,y+w ELSE PLOT 85,x
,y+w
 4120 IF f=0 DRAW x,y+w ELSE PLOT 85,x+l
,y+w
 4130 MOVE x,y+w:IF f=0 DRAW x,y ELSE MO
VE x,y
 4140 ENDPROC
 4150 :
 4160 DEF PROCdh(t$,x,y)
 4170 PRINTTAB(x,y);
 4180 LOCAL loop%
 4190 FOR loop%=1 TO LEN (t$)
 4200 PROCextend("H",ASC(MID$(t$,loop%,1
)))
 4210 NEXT
 4220 ENDPROC
 4230 :
 4240 DEF PROCextend(d$,c%)
 4250 X%=&70:Y%=0:?X%=c%:A%=10:CALL &FFF
1
 4260 IF d$="H" THEN VDU 23,128,X%?1,X%?
1,X%?2,X%?2,X%?3,X%?3,X%?4,X%?4,128,8,10
,23,128,X%?5,X%?5,X%?6,X%?6,X%?7,X%?7,X%
?8,X%?8,128,11:ENDPROC
 4270 LOCALc%,p%,h%,n%,t%
 4280 FOR c%=1 TO 5 STEP 4
 4290 FOR p%=4 TO 0 STEP -4:VDU 23,128
 4300 FOR h%=c% TO c%+3:t%=0
 4310 FOR n%=p% TO p%+3:IF (2^n% AND X%?
h%) THEN t%=t%+3*(4^(n%-p%))
 4320 NEXT:VDU t%,t%:NEXT:VDU 128:NEXT:V
DU 8,8,10:NEXT:VDU 11,11,9,9
 4330 ENDPROC
 4340 :
 4350 DEF PROCdhdw(t$)
 4360 LOCAL loop%
 4370 FOR loop%=1 TO LEN (t$)
 4380 PROCextend("HW",ASC(MID$(t$,loop%,
1)))
 4390 NEXT
 4400 ENDPROC
 4410 :
 4420 DEF PROCdrawbargraf(s,n,mx,mn)
 4430 IF max-min = 0 THEN PROCmess("Data
 missing for this graph - reselect!"):A$
=INKEY$(200):ENDPROC
 4440 PROCaxis
 4450 PROCdobar(section,number,max,min)
 4460 ENDPROC
 4470 :
 4480 DEF PROCdobar(s,n,mx,mn)
 4490 COLOUR 2
 4500 GCOL 0,2:LOCAL loop%
 4510 FOR loop%=0TO number-1
 4520 PROCrect(128+loop%*xscale,64-mn*ys
cale,xscale/2,Q(s,loop%+1,0)*yscale,1)
 4530 NEXT:ENDPROC
 4540 :
 4550 DEF PROCdrawlinegraf(s,n,mx,mn)
 4560 IF mx-mn = 0 THEN PROCmess("Data m
issing for this graph - reselect!"):A$=I
NKEY$(200):ENDPROC
 4570 PROCaxis
 4580 PROCdoline(s,n,mx,mn)
 4590 ENDPROC
 4600 :
 4610 DEF PROCdoline(s,n,mx,mn)
 4620 COLOUR 2
 4630 GCOL 0,2:LOCAL loop%
 4640 MOVE 128,(64-mn*yscale)+Q(s,1,0)*y
scale
 4650 FOR loop%=0 TO number-1
 4660 DRAW 128+loop%*xscale,(64-mn*yscal
e)+Q(s,loop%+1,0)*yscale
 4670 NEXT:ENDPROC
 4680 :
 4690 DEF PROCdrawpiechart(s,n,mx,mn)
 4700 IF mx-mn = 0 THEN PROCmess("Data m
issing for this graph - reselect!"):A$=I
NKEY$(200):ENDPROC
 4710 PROCdopie(s,n,mx,mn)
 4720 ENDPROC
 4730 :
 4740 DEF PROCdopie(s,n,mx,mn)
 4750 RESTORE 5100
 4760 total=FNtotal(s,n)
 4770 LOCAL loop%,angle,lastangle,centre
 4780 centre=320
 4790 lastangle=90
 4800 FOR loop%=1 TO n
```

Continued ▶

JOE'S JOTTINGS

◀ Joe's Jottings, continued

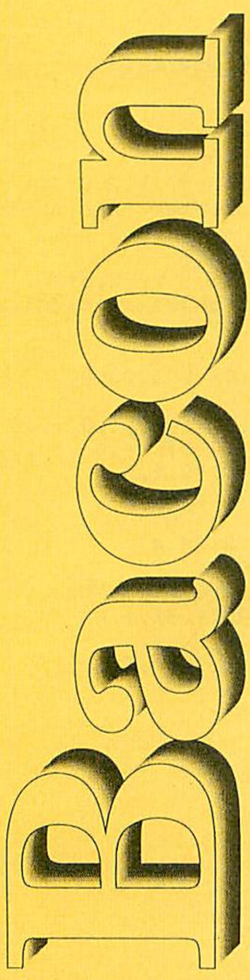
```
4810 MOVE centre,500:MOVEcentre+290*COS
(RAD(lastangle)),500+290*SIN(RAD(lastang
le))
4820 angle=lastangle+ABS(Q(s,loop%,0))*
360/total
4830 PROCef(loop%-1)
4840 PLOT 181,centre+290*COS(RAD(angle)
),500+290*SIN(RAD(angle))
4850 lastangle=angle
4860 MOVE 904,(1024-(loop%*2+4)*32)
4870 MOVE 840,(1024-(loop%*2+6)*32)
4880 PLOT 85,940,(1024-(loop%*2+6)*32)
4890 GCOL 0,3
4900 MOVE 904,(1024-(loop%*2+4)*32)
4910 DRAW 840,(1024-(loop%*2+6)*32)
4920 DRAW 940,(1024-(loop%*2+6)*32)
4930 DRAW 904,(1024-(loop%*2+4)*32)
4940 VDU 5:PRINT " ";Q$(loop%);:VDU 4
4950 NEXT
4960 GCOL 0,1
4970 MOVE centre,500
4980 PLOT 149,centre,794
4990 ENDPROC
5000 :
5010 DEF PROCef(c)
5020 IF INT(c/20)*20=c THEN RESTORE 510
0
5030 LOCAL loop%
5040 VDU 23
5050 FOR loop%=0 TO 8
5060 READ d:VDU d:NEXT
5070 GCOL 16*(c DIV 4),c MOD 4
5080 ENDPROC
5090 :
5100 DATA 12,0,0,0,0,0,0,0,0
5110 DATA 12,1,1,1,1,1,1,1,1
5120 DATA 12,2,2,2,2,2,2,2,2
5130 DATA 12,3,3,3,3,3,3,3,3
5140 :
5150 DATA 12,0,1,0,1,0,1,0,1
5160 DATA 12,0,2,0,2,0,2,0,2
5170 DATA 12,0,3,0,3,0,3,0,3
5180 DATA 12,0,1,1,0,0,1,1,0
5190 :
5200 DATA 13,0,2,2,0,0,2,2,0
5210 DATA 13,0,3,3,0,0,3,3,0
5220 DATA 13,1,2,1,2,1,2,1,2
5230 DATA 13,1,3,1,3,1,3,1,3
5240 :
5250 DATA 14,1,2,2,1,1,2,2,1
5260 DATA 14,1,3,3,1,1,3,3,1
5270 DATA 14,2,3,2,3,2,3,2,3
5280 DATA 14,2,3,3,2,2,3,3,2
5290 :
5300 DATA 15,0,0,1,1,0,0,1,1
5310 DATA 15,0,0,2,2,0,0,2,2
5320 DATA 15,0,0,3,3,0,0,3,3
5330 DATA 15,2,2,1,1,2,2,1,1
5340 :
5350 DEF FNtotal(s,n)
5360 LOCAL total
5370 total=0
5380 FOR lp=1 TO n
5390 total=total+ABS(Q(s,lp,0))
5400 NEXT
5410 =total
5420 :
5430 DEF PROCaxis
5440 GCOL 0,1
5450 PROCrect(128,64,1024,832,0)
5460 IF mn>0 THEN mn=0
5470 yscale=832/(mx-mn)
5480 FOR y=64 TO 896 STEP 64
5490 @%=z%:MOVE 1152,y:DRAW 100,y:MOVE
0,y+16
5500 yval=INT(((y-64)/yscale)*10+.5+mn*
10)/10
5510 VDU 5
5520 IF yval<10 AND yval>-10 THEN PRINT
;yval:ELSE PRINT;INT(yval)
5530 VDU 4:@%=&20209
5540 NEXT
5550 GCOL 0,3:MOVE 100,64-mn*yscale:DRA
W 1180,64-mn*yscale:GCOL 0,1
5560 xscale=1024/number
5570 FOR x=128 TO 1152 STEP xscale
5580 GCOL 0,2:COLOUR 2
5590 tval=((x-128) DIV xscale)+1
5600 IF tval<=ca THEN @%=z%:MOVE x,48:V
DU 5:PRINT LEFT$(Q$(tval),xscale/32);:VD
U 4:@%=&20209
5610 GCOL 0,1
5620 MOVE x,48:DRAW x,896
5630 NEXT
5640 @%=z%
5650 GCOL 0,3:COLOUR 3
5660 ENDPROC
5670 :
5680 DEF PROCmess(t$)
5690 PROCdh(t$,(20-LENt$/2),30)
5700 ENDPROC
5710 :
5720 DEF PROCdumpout(b)
5730 b=1-b
5740 PROCdh(STRING$(36," "),2,b*30)
5750 PROCdh("Setup printer then press R
ETURN.",4,b*30)
5760 REPEAT UNTIL GET=13
5770 PROCdh(STRING$(36," "),2,b*30)
5780 IF b=0 THEN PROCdh(S$(section),20-
(LEN(S$(section))/2),0)
5790 DIM P%3,Q%3
5800 !P%=&03010000:!Q%=&03020100
5810 MOVE 0,0
5820 VDU 29,0;0;2,1,27,1,65,1,8,1,10
5830 FOR Y%=1020 TO 12 STEP-16
5840 VDU 1,27,1,76,1,192,1,3
5850 FOR X%=0 TO 1276 STEP 4
5860 A%=0:B%=0
5870 FOR Z%=0 TO 12 STEP 4
5880 C%=POINT(X%,Y%-Z%)
5890 A%=A%*4+P%?C%:B%=B%*4+Q%?C%
5900 NEXT Z%:VDU 1,A%,1,B%,1,A%
5910 NEXT X%:VDU 1,10
5920 NEXT Y%:VDU 1,27,1,64,3
5930 ENDPROC
```

See Postscript, page 72

Listing 1. Fan

```
%
%  Acorn User Fan Display by David Atherton
%
%
/selectfont                             % Select Times Italic 24pt
{ /Times-Italic findfont                % Load Times Italic Font
     24 scalefont                       % Select 24 point version
      setfont                     }     % Make the default
def                                     % PROC syntax \<name { <code> } def
%
/printtext                              % Print 'Acorn User' in grey
{  setgray                              % Take argument from call
   36 -12 moveto                        % MOVE 36,-12
   (BBC Acorn User) show                % PRINT "BBC Acorn User"
   30 rotate                  }         % Rotate by 30 deg for next call
def
%
% Main program
%
270 360 translate                       % ORIGIN 270,360
selectfont                              % PROCSelectFont
%
0 0.075 .9                              % FOR n=0 TO 0.9 STEP 0.075
{ printtext }                           % PROCPrintText(n)
for                                     % NEXT
%
showpage                                % Execute the program
```

Listing 2. Bacon



```
%!
% Bacon
% by Dave Lawrence
% for B/B+/M/C/E/A
% (c) BAU June 1989
%

/inch { %def                            % define the 'inch' word
  72 mul
} def

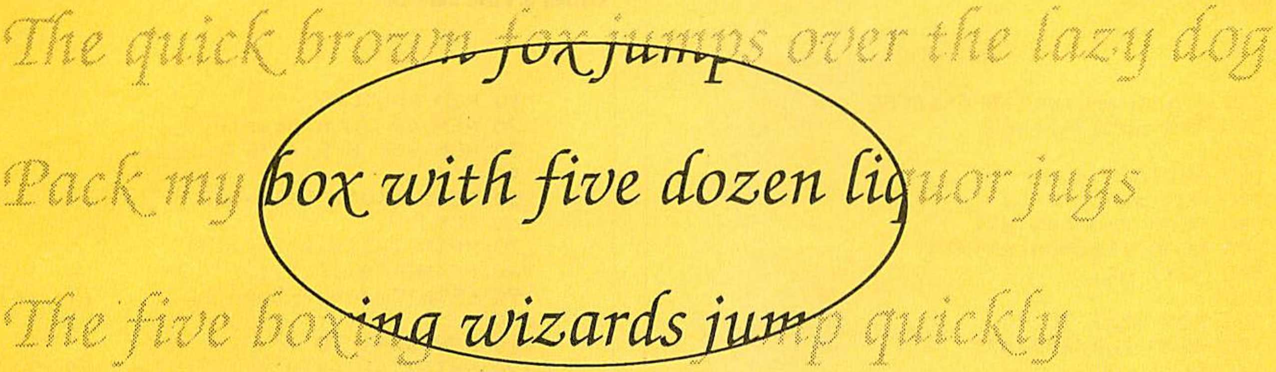
/print { %def                           % define the 'print' word
  /str exch def                         % get string to print
  /y exch def                           % get y position
  /x exch def                           % get x position
  10 -0.5 0 { %for                      % start of FOR loop
    /i exch def                         % get loop variable
    i 2 mul x add                       % calculate x offset
    y i 2 mul sub                       % calculate y offset
    moveto                              % move to the point
    10 i sub 10 div setgray             % calculate grey level
    str show                            % print the string
  } for
  x y moveto                            % move to 'base' position
  0.5 setlinewidth                      % set line width
  str true charpath                     % convert string to path
  0 setgray                             % set colour to black
  stroke                                % 'draw' the outline
} def

/NewCenturySchlbk-Bold findfont % set font to use
230 scalefont                           % scale it nice'n'big
setfont                                 % set the font ready for use

                                        % change to 'landscape'
0.5 inch 11 inch translate              % move to top left hand corner
-90 rotate                              % rotate by 90 degrees

0 inch 4 inch (Bacon) print             % print 'Bacon'
showpage                                % print the page
```

Listing 3. Clipping




```
%!
% ClipDemo
% by Dave Lawrence
% for BBC B/B+/M/C/E/A
% (C) BAU June 1989

/text { % def
  50 350 moveto (The quick brown fox jumps over the lazy dog) show
  50 280 moveto (Pack my box with five dozen liquor jugs) show
  50 210 moveto (The five boxing wizards jump quickly) show
} def

/ZapfChancery-MediumItalic          % Set up name of font
findfont                            % select font
40 scalefont                        % scale font to 40 point
setfont                             % set up font ready for use

0.5 inch 11 inch translate          % move to top left hand corner
-90 rotate                          % rotate by 90 degrees

0.7 setgray                         % select 30% grey
text                                % print sample text

0 setgray                           % select black

2 1 scale                           % scale X co-ordinates by 2

newpath

170 280 80 0 360 arc                % set up an ellipse

gsave
  stroke                            % draw the ellipse
grestore
clip                                % set the clipping path

0.5 1 scale                         % restore normal X coordinates
text                                % print sample text

showpage                            % print page
```

See standing variables, page 80

Listing 1. Configuration

```
 10 REM CALCONFIG
 20 REM by John Stanley
 30 REM for B/B+/M/C/E
 40 REM (c) BAU June 1989
 50 :
 60 MODE4
 70 pp%=?&2:qq%=?&3
 80 ?&2=0:?&3=&B
 90 DIM Zmonth$(12)
100 DIM ZlenMonth%(12)
110 DIM Zwkday$(7)
120 Zmonth%=0
130 Zyear%=0
140 Ztitle$="Perpetual Calendar"
150 :
160 FOR Z%=0 TO 12
170 Zmonth$(Z%)=STRING$(9,"*")
180 NEXTZ%
190 FOR Z%=0 TO 7
200 Zwkday$(Z%)=STRING$(3,"#")
210 NEXT Z%
220 :
```

Continued▶

◀ Listing 1 continued

```
230 ZEndZvarList%=&FFFFFFFF
240 ?&2=pp%:?&3=qq%
250 :
260 RESTORE 400
270 FOR m%=1 TO 12
280 READ Zmonth$(m%)
290 READ ZlenMonth%(m%)
300 NEXT m%
310 :
320 FOR m%=1 TO 7
330 READ Zwkday$(m%)
340 NEXT m%
350 :
360 IF T% THEN PROCtest:T%=0
370 CHAIN"PC"
380 END
390 :
400 DATA JANUARY,31,FEBRUARY,28
410 DATA MARCH,31,APRIL,30,MAY,31
420 DATA JUNE,30,JULY,31,AUGUST,31
430 DATA SEPTEMBER,30,OCTOBER,31
440 DATA NOVEMBER,30,DECEMBER,31
450 DATA Sun,Mon,Tue,Wed,Thu,Fri,Sat
460 :
470 DEF PROCtest
480 VDU14
490 *SAVE TEST B00 D00
500 *DUMP TEST
510 PRINT''"Press Key"
520 G=GET
530 CLS
540 ENDPROC
```

Listing 2. Date input

```
 10 REM PC
 20 REM by John Stanley
 30 REM for B/B+/M/C
 40 REM (c) BAU June 1989
 50 :
 60 ?&4B4=&00:?&4B5=&0B
 70 *FX 202,32
 80 :
 90 PROCin
100 CHAIN "PRNTCAL"
110 END
120 :
130 DEF PROCin
140 Zmonth%=0
150 CLS
160 PRINTTAB(10,10)
170 INPUT "Year and Month   " in$
180 Zyear%=VAL(in$)
190 IF Zyear%<100 Zyear%=Zyear%+1900
200 IF Zyear%<1600 THEN PROCin
210 REPEAT
220 x%=-1
230 IF ASCin$<65 OR ASCin$>83 THEN in$
=RIGHT$(in$,LEN(in$)-1):x%=0
240 UNTIL x% OR LEN(in$)=0
250 IF in$="" THEN PROCin
260 FOR m%=1 TO 12
270 IF in$=LEFT$(Zmonth$(m%),LEN(in$))
 THEN Zmonth%=m%
280 NEXT m%
290 IF Zmonth%=0 THEN PROCin
300 ENDPROC
```

Listing 3. Print calendar

```
 10 REM PRNTCAL
 20 REM by John Stanley
 30 REM for B/B+/M/C
 40 :
 50 ?&4B4=&00:?&4B5=&0B
 60 CLS
 70 PRINTTAB(2,2)Ztitle$
 80 PRINTTAB(10,5);
 90 PRINTZmonth$(Zmonth%);"  ";Zyear%
100 :
110 FOR d%=1 TO 7
120 PRINTTAB(6*(d%-1),7) Zwkday$(d%)
130 NEXT d%
140 nod%=ZlenMonth%(Zmonth%)
150 IF Zmonth%=2 THEN PROCleap
160 PROCwkday(1,Zmonth%,Zyear%)
170 firstday%=wkday%
180 line%=9
190 :
200 FOR day%=1 TO nod%
210 wkday%=(day%+firstday%-1) MOD 7
220 wkday%=wkday%+1
230 chr%=6*(wkday%-1)
240 PRINTTAB(chr%,line%)STR$(day%)
250 IF wkday%=7 THEN line%=line%+2
260 NEXT day%
270 :
280 PRINT'''"(Q)uit"
290 G$=GET$
300 IF G$="Q" THEN  END
310 CHAIN"PC"
320 END
330 :
340 DEF PROCleap
350 IF (Zyear% MOD 4)=0 THEN nod%=29
360 IF (Zyear% MOD 100)=0 THEN nod%=28
370 IF (Zyear% MOD 400)=0 THEN nod%=29
380 ENDPROC
390 :
400 DEF PROCwkday(day%,month%,year%)
410 month%=12*(year%+4800)+month%-3
420 year%=month%-INT(month%/12)*12
430 JD=day%+INT(month%/48)+INT((365*mo
nth%+2*year%+7)/12)-32083.5
440 JD=JD+INT(month%/4800)-INT(month%/
1200)+38
450 wkday%=(JD+1.5) MOD 7
460 ENDPROC
```

Listing 4. Recursion

```
 10 REM RECUR
 20 REM by John Stanley
 30 REM for B/B+/M/C
 40 REM (c) BAU June 1989
 50 :
 60 CLS
 70 A%=0
 80 PROCagain
 90 END
100 :
110 DEF PROCagain
120 REM LOCAL a,b,c,d
130 A%=A%+1
140 PRINTTAB(20,10)A%
150 PROCagain
```

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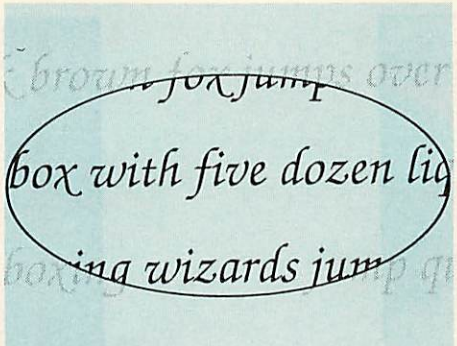
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OFFERS

THIS MONTH'S LISTINGS

Administering a school or busy office is not an easy task. Well, this month Joe helps out by providing a program that helps you keep track of your stock and all those unwelcome bills. This facility not only allows details to be displayed pictorially, it also allows you to choose between bar, line graphs or pie charts.



June's Hints and Tips are a 'type-set' style program on a 9-pin dot-matrix printer; *View* to *Wordwise* file converter and an overtype facility for *InterWord*.

This month's Arc Agora includes an analogue joystick using the mouse, a program that cuts back on some column-width restrictions by allowing you to print listings using two or more columns.

There's a program to illustrate the Post-script graphics language. Plus a method for passing variables between programs.

And finally there's a selection of ray-traced pictures on the 3.5-inch disc.

Summer budgeting and printing in style

GAMES DISC

Ten of the best *Acorn User* games on one 80-track double-sided 5.25-inch disc.

Whether you're into arcade or adventure type games this new disc has something for everyone. The games included are *Warlord*, *Wizalon*, *Castle of Nightmares*, *Run Silent*, *Run Deep*, *Polyominoes* and *Quadline*. We have also included three of the most popular one-line games from recent Abusers. Test your knowledge with *Mastermind* and start playing *Varpon* and *Lurch* to win.

Make sure you get your disc of fun and entertainment and send off for the Games disc today. At only £8.95 it will make the perfect gift.

Games galore for just £8.95



'87 COMPILATION DISC

BBC Acorn User has put all your favourite programs, routines and utilities from 1987 on one disc.

Featured are: Kiddie Art; Tapestry; PCB by CAD; Autumn and Theme, our music programs from April '87. Also featuring on the disc is Joe Telford's GEM-like front end for the Master including a desktop calendar and year planner.

Other useful utilities include a proportional screen dump, a *View* printer driver generator, a monitor-testing routine and a routine for printing spread-sheets sideways.



The second half of the disc is devoted to graphics, with a video image enhancer and six of the best Graphics Bonuses.

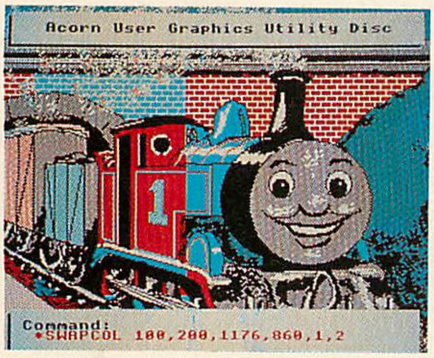
The *Acorn User* '87 Compilation disc comes in 5.25-inch 80-track format, with a comprehensive manual which includes all function key strips and instructions needed for the programs.

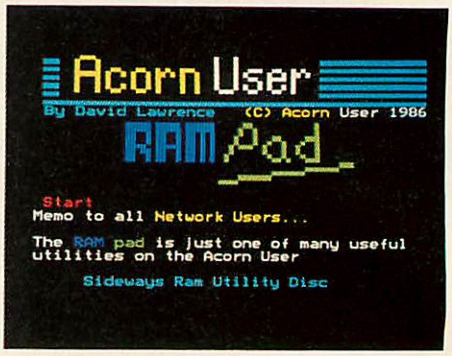
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SOFTWARE & GRAPHICS





Great graphics utilities

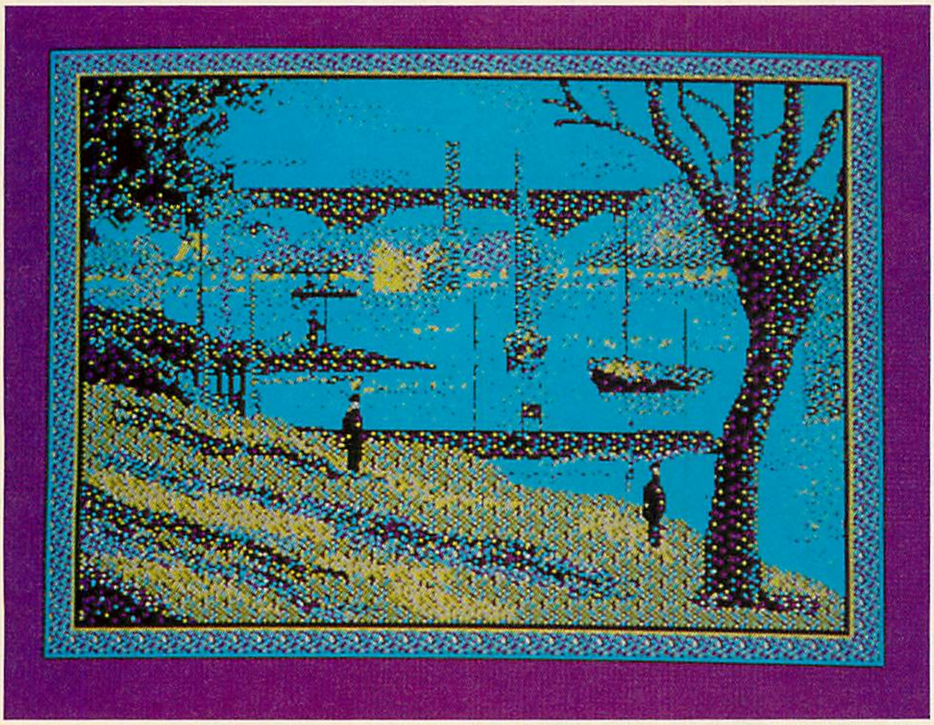
The 40-track 5.25-inch *Graphics Utilities* disc which is keenly priced at £7.95, features not only 16 stand-alone machine code utilities, an advanced teletext editor and several useful Basic procedures, it also has an easy-to-adapt disc header and index.

Included are: *Rotate, rotates area through 180 degrees; *SwapCol, swaps two colours; *ColFill, a colour-fill routine; *SvPic, saves a compacted picture; *LdPic, reloads a compacted picture. There are also many utilities to manipulate graphics.

Sideways RAM made simple

The *Acorn User* sideways RAM disc gives you many more utilities for your sideways RAM. These include: RAMpad – your computer's answer to the pad and pen; six different on-screen fonts available in all modes; a 15k printer buffer; Screen Swap – store and recall mode 4 or 5 screens; *RomHead – standard service ROM header; *RLook – allows you to examine sideways RAM or ROM.

There are many more utilities on this 40/80-track 5.25-inch disc and it's a snip at £9.95.



Micro masterpieces on Portfolio for £9.95

Jonathan Inglis, freelance illustrator, has assembled a *Portfolio* of his best work exclusively for *BBC Acorn User.*

The disc contains screens that have been used by national and regional publications. Included are Seurat's *Bathers,* a *Time Out* cover from August 1985, and two familiar *Acorn User* covers, Willow (Nov '86) and Magician (Jan '86), as well as several pictures commissioned by *The Times.*

Three of Jonathan's favourite masterpieces are on the disc; Seurat's *Riverside,* Vermeer's *Lady at the Virginal* and a copy of a famous lithograph by Matisse. Sade fans will probably be more interested in the two stunning portraits of the singer included on the disc.

You can create your own pièce de résistance using the *Pixel Editor* and *Super Painter* programs. *Pixel Editor* allows you to draw in and alter minute detail, while *Super Painter* enables you to draw lines, texture your screen and shade by mixing the eight standard colours.

Portfolio comes in 80-track 5.25-inch format with a comprehensive instruction sheet telling you about the pictures and how the artist created them. This disc can be yours for only £9.95.

TO ORDER USE THE FORM ON PAGE 114

OFFERS

CAMP BEAUMONT



Bring out the best in the children and save money

Do you dread the approach of the school holidays? When your life is turned upside down, inside out by your children. Do you worry how you are going to prevent them from becoming BORED.

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Send this to **Kay Lever, *BBC Acorn User* offer, Camp Beaumont, 9 West Street, Godmanchester, Cambridge PE18 8HG.**



S·C·A·N LIGHT

The scanner, interface & software for the Archimedes



The Hardware

Scan-Light is based around the scanner interface used for FAX-PACK and provides a low cost way to input high quality scanned or 'digitised' text and pictures into the Archimedes.

Scan-Light consists of a half-width expansion board (that will fit into any Archimedes), on board ROM software and an 8.5 inch 200 dpi scanner.

The hand-held scanner will scan pictures or text from loose pages, photographs and books, and because of its full A4 width it will scan complete A4 pages of text or pictures up to 8.5 by 11.5 inches in size. As such, it is far more flexible and useful than other 'half- width' scanners. The scanner also has a brightness control to cater for a range of document contrasts.

Scanning a picture is simple; the scanner is placed at the top of the picture, a menu option is chosen and the scanner is just rolled over the page. The scanner interface ensures the picture is scanned accurately at 200 dots per inch, irrespective of the scan speed.

Completely compatible with Arthur and the new RISCOS operating systems. It can, for example, run on the RISCOS desktop, where it can create files for direct use in the RISCOS paint or draw programs. These programs would allow the pictures to be edited or altered in an infinite number of ways.

28 days 'no quibble' money back guarantee, in addition to the normal 1 year parts/labour guarantee and free software update service.

The Software

All the necessary scanner controlling software is included on a ROM as part of the scanner interface — it does not require a disc.

The software is WIMP based which makes it very easy to use, with all features being controlled by menu options. These features include:

• The currently scanned page is viewed within a window, which can be scrolled and re-sized like all windows.

• It is possible to 'zoom in' or 'zoom out' so the scanned image may be viewed at any size or scale from 1% to 999%.

• Pixel editing facilities allow individual 200 dpi pixels to be drawn or 'undrawn'.

• Printer drivers are included to print the image to a variety of dot-matrix, inkjet and laser printers.

• The scan can be either a monochrome scan (best for text) or a 'half-tone' scan (best for pictures).

• The image may be viewed either as a monochrome, or 16 grey level picture.

• The whole image, or any selected part, may be saved in a variety of ways:

i) As a compressed data file (saves disc space).

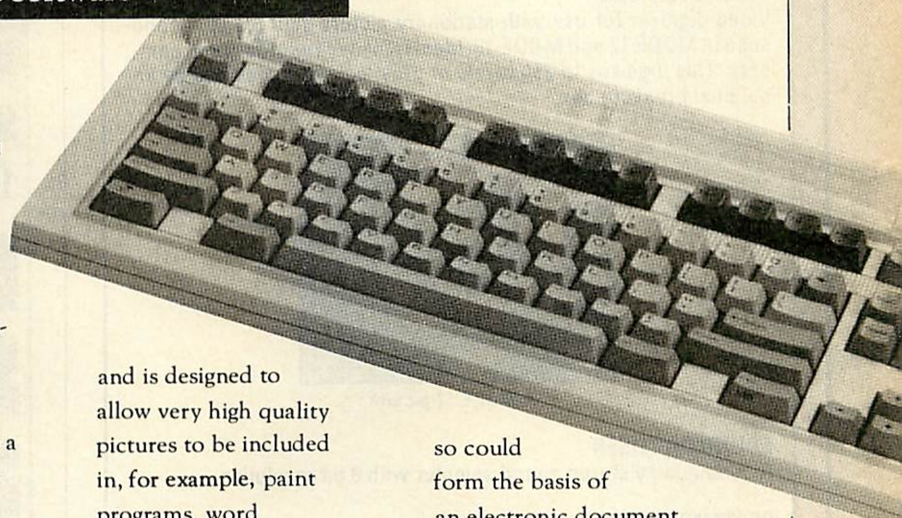
ii) As a monochrome black and white sprite.

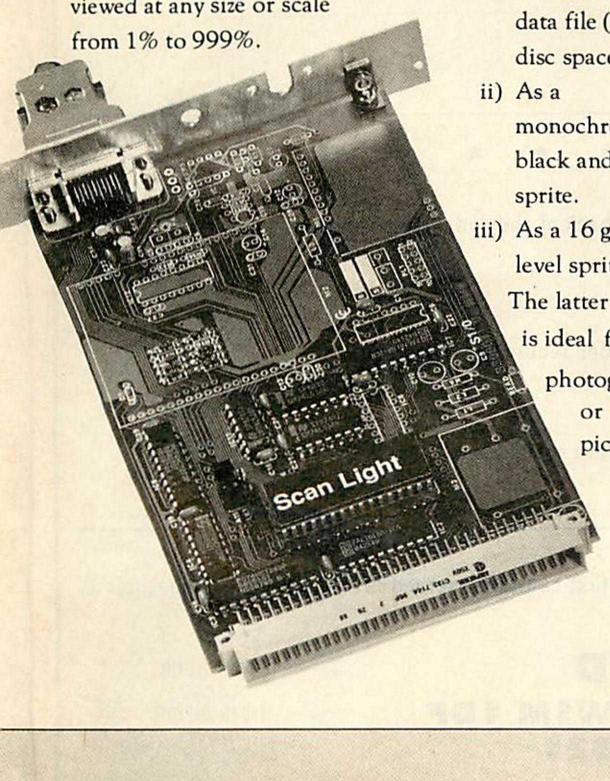
iii) As a 16 grey-level sprite.

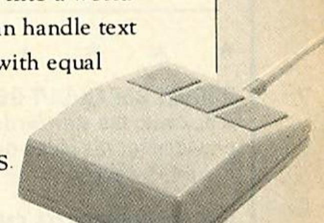
The latter option is ideal for photographs or pictures and is designed to allow very high quality pictures to be included in, for example, paint programs, word processors or DTP programs.

Scan-Light is equally suited to capturing photographs from magazines, diagrams or printed text from books, or hand written notes or signatures. An entire A4 page can be scanned into the computer and then filed away on disc to be recalled later (so it can be viewed, subsequently edited or re-printed) and so could form the basis of an electronic document archiving system. It could also be used to build libraries of pictures or diagrams for future reference.

Scan-Light, in conjunction with the outstanding graphics facilities available on the Archimedes, finally takes computers away from their text only backgrounds, into a world where they can handle text and pictures with equal ease.







Hardware and Software runs on Arthur and RISCOS operating systems, requires 1 MByte machine.

Price £449.00 + VAT for scanner, interface board & software.

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REVIEWS

THE GAMES PAGE

THE BEST YET

Sam Greenhill lets readers take the floor with scores high and low

As the Redwood front doors aren't exactly blocked with new games for the run up to summer, I've managed to dig up the high scores from May last year.

Now of course some of the scores may well be heavily out of date so it's up to you to rectify this by writing to me with a better one. It would also be nice to have a few Archimedes achievements sent in, particularly from the Minerva selection.

Since last year, a great many new games have appeared on the market so obviously they can't be found on the table but don't let this deter you! Please write in with your high score.

A recent letter from Stephen Hunt of Cambridge informs me of an exceedingly high score in Grandslam's *Pacmania* and also inquires into the business of proving the scores – simple but necessary.

We can't accept any scores without some form of proof. You can either take a photo of the high score table on screen (the picture doesn't have to be Academy Award winning, just good enough to show the score!) Alternatively, get someone else (over the age of 18) to witness the score and countersign your letter.

Topologika – responsible for many of the early adventures – has announced plans for its more prominent titles to be ported across to the Archimedes.

Actually, all that programmers Jonathan Partington, Jon Thackray and Peter Killworth have done is to alter the PC versions so they will work under the PC Emulator. A 3.5-inch compilation disc will soon be available and will include games such as *Countdown to Doom*, *Kingdom of Hamil*, and *Philosopher's Quest*.

I understand that the games haven't been enhanced to use the Archimedes extra power but nevertheless the asking price of £20 is reasonable enough.

My favourite game at present is Impact's *Holed-Out*, an impressive and surprisingly good golf simulation, especially as it came from the author behind the budget-priced *Clogger*. At present only the BBC micro version is available but this has certainly whetted my appetite.

The game is well thought out and incorporates effects such as wind and slopes. I wouldn't have thought it was possible to get a better simulation out of the beeb, mind you I expect something along those lines was said before *Elite*.

The Archimedes version is due in early May but it will have to face a strong rival being released at the same time. US Gold is dipping its toes into the Arc market and let's hope the company likes the feel of things and sets up permanent camp. Its first release is *Leaderboard*, another golf simulation which has proved popular on machines such as the Atari ST and Amiga. Archie *Leaderboard* is no mere conversion and will feature better sound and graphics than both ST and Amiga versions.

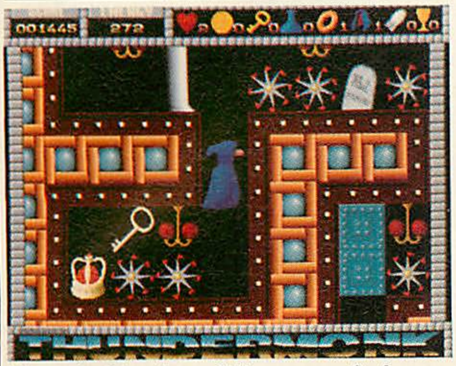
Superior has compiled another bunch of *Play it Again Sams* (yawn) now into double figures. *Pias 10* contains the excellent *Zalaga*, *Repton Thru Time*, Blue Ribbon's *3D-Dotty*, and a new game called *Quack*, similar to the old favourite *Chuckie Egg*.

ACORN USERS' HIGH SCORES

Game	Score	Name
Alien 8	28 lost	F Brown
Android Attack	149,105	T Hedger
Arcadians	98,020	N Islam
Arkanoid	381,820	A Gorst
Aviator	30,450	P Hopgood
Battletank	117,400	S Gayler
Beach Head (B)	806,200	P Wallace
Beach Head (E)	361,000	I Pierce
Boffin	582,155	I Surman
Castle Quest	2,240	P Simpson
Centipede	2,000,010	C Cochrane
Chuckie Egg	32,002,640	N Wright
Commando	443,100	P Wallace
Contraption	993,200	C Cochrane
Cybertron	1,856,840	S Gelder
Danger UXB!	105,710	M Gullick
Dunjunz	5,282	R Jackson, S Hickling R Archer, J Hickling
Eagle's Wing	460,400	S Greenwood
Exploding Fist (B)	397,100	C Parsons
Exploding Fist (E)	597,000	H Moore
Firetrack	375,900	S Gibson
Fortress	138,720	S Gayler
Frak!	20,000,200	P O'Malley
Free Fall (B)	5,024	P Comber
Free Fall (E)	7,605	I Jones
Frenzy	581,399	I Lay
Hopper	63,104	N Brown
JCB Digger	131,450	S Concoran
Joust	19,950	S Brown
Karate Combat	229,538	K Stafford
Labyrinth	348,800	I Lay
Match Day	16-0	J Freu
Meteors	498,500	P Ludgate
Missile	469,225	I Boffin
Monsters	283,000	S Concoran
Moonraider	642,125	S Concoran
Mr Ee!	1,415,500	S Roberts
Overdrive (B)	380,640	S Gayler
Overdrive (E)	1,130,700	S James
Pacmania (A)	1,279,140	S Hunt
Painter	203,690	N Shaw
Pengo	312,900	S Killworth
Plan B	14,090	S Hewson
Planetoid	3,186,450	S Concoran
Pole Position	111,750	S Goodchild
Repton 2	29,064	S Hewson
Rocket Raid	168,010	S Gayler
Snake	1,575	R O'Conner
Snapper (B)	2,187,670	P Simpson
Snapper (E)	2,429,198	R Cusworth
Space Adventure	4,890	M Bradshaw
Starship Command	8,420	I Boffin
Stryker's Run	36,060	T Green
Thrust	1,054,450	T Simpson
Winged Warlords	336,000	C Dunn
Yie Ar Kung Fu	675,300	I Surman
Zalaga	29,329,420	S Gayler
Zarch (A)	783,764	A Norris

GAMES

MONKEY BUSINESS



ThunderMonk; Minerva Software Archimedes 3.5-inch disc, £14.95

Set in a ghostly castle, *ThunderMonk* is another game which Minerva designed for the children of those business people who buy its business software.

You take the part of an apparitional monk floating round (and sometimes through) the castle collecting goblets. Three goblets must be obtained for the thundermonk to complete a level but liberally sprinkled around are plenty of other objects such as doughnuts, crowns and gold sovereigns. All these are considered useful for our monk but not everything smells of roses.

Cacti reduce energy levels and so do spiked wagon wheels and rotating pink bolases. Some can be destroyed by hurling a ball of fire or a dagger at them and this also applies to certain blocks which vanish most realistically when hit.

Energy 'pills' reset the monk's power so it is advisable to use them only when the sampled voice says 'energy low', although bunches of grapes and batteries perform much the same task.

This isn't very logical so far but who cares? Without doubt *ThunderMonk* has a 'Minerva-ish' feel to it and the game resembles *Hoverbod* in a variety of ways.

The sprites are large and nicely animated in the usual Minerva fashion and the scrolling is very acceptable. The four levels are of increasing order of difficulty and the fourth is colossal. At least, the authors tell me it's colossal, I've never actually got there. Frankly, unless your brain is up to Mensa standard I wouldn't bother trying!

Seriously though, the so and so's at Minerva have probably used a fair quantity of Arc memory for the maps and it takes a good hour to get the feel of some of them. The puzzles are well thought out and often become highly frustrating, especially when dextrous keyboard manipulation is required.

Sound has been well done but sadly the sampled noises and voices are not being used in a spot the sound competition (See March Games Page) – this is being saved for *Ibix the Viking*, due soon. Humour now comes as relatively standard in Minerva games and *ThunderMonk* doesn't miss out.

For some completely obscure reason there is a lamb bleating loudly near the start of the second level and I could think of nothing less subtle to silence it than to throw a dagger at the poor thing (Don't tell the RSPCA), to which it responded by promptly vanishing.

Although this game could quite easily have been done on the BBC, graphics, size and possible sound aside, I think I can recommend it, particularly as I now know exactly who it's aimed at. It isn't as good as *Orion* but safely comes second best in my book. **Sam Greenhill**

A CASE OF BARBARISM



Barbarian II; Superior Software, BBC/Electron cassette £9.95, BBC disc £11.95.

Barbarian II, surprisingly enough is the sequel to *Barbarian I*. The Barbarian is the same, so is the bad Guy (Drax), the game however, is not.

In *Barbarian I*, the game consisted only of fighting one opponent after another. There is a bit more to it in the sequel.

The game is split into four levels, each level consisting of a maze of 26 screens. On each level there are two objects to be collected, for use in the final confrontation with Drax.

Movement between each screen is achieved by moving left or right off the current screen or by entering a cave or doorway which brings you out on to a different screen. One of a variety of monsters will materialise with a cloud of smoke in front of you on each screen and will then do its utmost to kill you, by pecking, stinging, or biting. The method used depends on the speciality of the monster involved.

The monsters are spectacular in size and design, the 'Living Idol' has to be the biggest character I've seen in a game on the Beeb, while the 'Slithering Things' look just like, er... um... slithering things!

Each screen has an interesting background. On the first level this is made up of mountain ranges, complete with volcanoes which billow out black smoke. Also to be seen on some screens is the odd head on a pole, just to add a certain atmosphere to the game.

Some screens also contain pits, into which you fall if you're not careful or if you're pushed by one of the monsters. The effects used for this are good. You either see the Barbarian topple or plummet, depending on whether he slipped or jumped in.

What's surprising about the game, especially considering the size of the sprites, is that it runs at a playable speed.

As with *Barbarian I*, it's the graphics that make the game. Having said this, the game play is an improvement on *Barbarian I* – it's more in the realm of an arcade adventure with combat, rather than a pure combat game.

The only thing lost in *Barbarian II* is the quality of the combat. Your opponents have only one style of attack each which can get a little repetitive. This is only partly compensated for by the variety of different monsters (17 in all).

Overall a most impressive and playable game. The worst thing about it is the rendition of Axel.F it contains. Fortunately this is only played between games.

Gavin Gillings

ENTHAR SEVEN

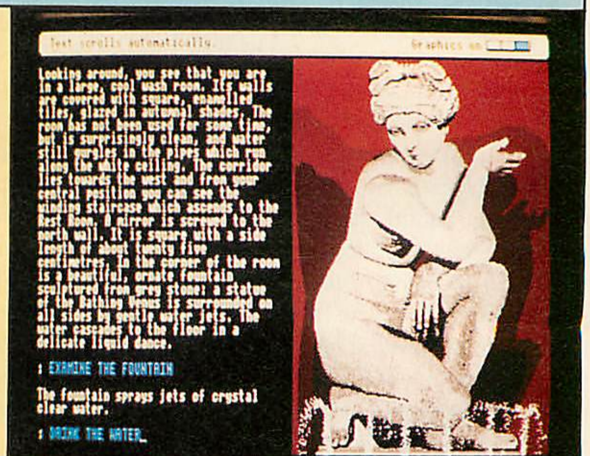
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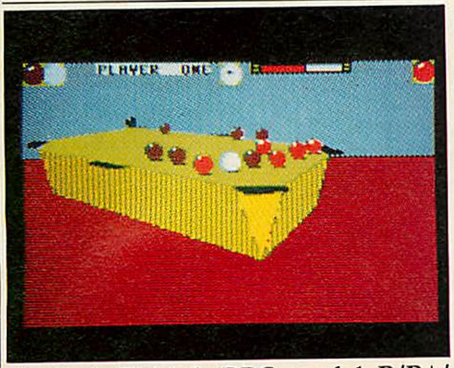
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REVIEWS

GAMES

POOLS OF FUN



3D-Pool; Firbird, BBC model B/B+/Master/Electron, cassette only, £8.99.

Imagine a solid, rectangular plinth with black squares at each of the top corners plus two more on the longer sides. Now add 15 balls neatly arranged in a triangle, and a white ball at the other end.

Drawing all this with an art package; making sure that everything is in perspective is hard enough, but drawing the whole lot in 'real-time' while the table tilts and rotates and the balls bounce realistically according to the laws of physics? Unless you saw this game for yourself, you just wouldn't believe it was possible – let alone on the humble Beeb.

By now you're probably thinking this is just an elaborate graphics demo. Wrong! Not only is *3D-Pool* graphically stunning, it also plays a mean frame of pool into the bargain.

There are various types of play including Practise (strongly advisable!), Two player (human this is) and Tournament (in which you must progress from quarter finals through to the final to meet 'Maltese Joe' himself. (For those unfamiliar to the international pool circuit, Maltese Joe is the actual European Champion and has endorsed the game).

Standard 8-ball pool rules apply, although the computer's interpretation of these can be a little doubtful at times. There is no downright cheating although the computer tends to bend the rules a little where it might be advantageous.

On the other hand, the computer will sometimes play shots that even Steve Davis (Yes, I know he's a snooker player!) would find near impossible. Doubling (knocking the object ball against a cushion before pocketing it) seems to be a particular favourite.

All in all, *3D-Pool* has to be the best sports simulation ever produced. If you're a Pool addict, this could even qualify as the best game ever.

Rob Miller

PAR EXCELLENCE



Holed Out!; The Fourth Dimension, BBC model B/B+/Master/Electron on cassette, £12.95, and disc £14.95.

A great many computer games seem to lose touch with reality.

I am tempted to suggest that *Holed Out!* has avoided this denegration – but only tempted because the over-simplification of golfing's handicap system into four playing levels is a fault I would have thought quite easily corrected.

The individual holes on each course are explicitly diagrammed with well-scaled features and hazards, but I would like to have seen more variation in height and density of the tree elements which are dotted around the course, and on occasion fill the screen with nowhere to go from here.

The choice of 10 irons – 1 to 9 – and wedge, and woods 1, 3 and 5 proved to be perceptively accurate allowing for wind and lie and I suspect the fairway gradients are there too, undisclosed.

On the greens the slopes are honestly indicated, and a gentle reminder that a 250 yards drive appears the same as a 12 inch putt (using 1.25 per cent power). It all takes experience.

A good game though, with more than passing reference to the ancient game as long as one can keep one's balls dry.

William Miller

A BIT OF BOUNCE

Overload; Clares, Archimedes disc £14.95.

An 11-legged flea controlling a metallic spheroid is what your role is in *Overload* – well at least that's what the instructions tell you. In fact you only get to see the sphere itself.

The bare bones of the game is a number of screens on which you can find a number of nasties. Killing these before a timer runs out results in you moving on to the next level.

The nasties are killed by bouncing the sphere on top of them. There is a specific order in which the nasties must be killed, the next one to get is indicated by a small square just above it. If you land on one out of sequence, it may split into two smaller nasties, making life more difficult.

The sphere bounces the whole time. The height of the bounce remains unchanged, unless the user presses Return. If this is done while the sphere is rising, the height of the bounce increases. Conversely, when the ball is falling the bounce height decreases. This system is quite irritating since once the bounce gets too low, you can't judge when to press Return to increase it again.

Pretty patterned backgrounds are used to cover most of the screen, similar to those found in *Arkanoid*. In the foreground there are thin walls on which the nasties wander. Some of the backgrounds are particularly well designed, as indeed are the nasties.

The sphere itself is not a bad representation of a steel ball and it is accompanied by a good 'boing' sound effect.

There are a few nice touches to be found. At the start of each game there is a very effective digitised thunder storm. I also liked the motion of the nasties down the sloping walls.

It would be unfair to say that *Overload* was a bad game. It is playable but I certainly would not class it as a 'mega game', as the blurb on the packet would have you believe. One thing is for sure, it definitely doesn't overload the Arcs capabilities.

Gavin Gillings

REVIEWS

BOOKS

OPERATION ARCHIE

Archimedes Operating System – a User's Guide by Alex & Nic van Someren; Dabs Press; £14.95

In the introduction to this book, the authors have included a section entitled 'What this Book is Not About'. This section explains that it is not for the inexperienced user, nor is it intended to replace the Acorn Programmer's Reference Manual (PRM).

Instead it is intended to make complex information easier to understand.

After brief introductions to Risc technology, ARM instructions, the Basic Assembler and the OS itself, the book concentrates on the most useful aspects of the operating system for experienced programmers. This includes filing systems, window and font managers, character input/output, interrupts and vectors. There is a comprehensive description of the sound facilities, and some particularly helpful information on writing modules and applications.

All the useful SWI (software interrupt) calls are described clearly and logically, and there are plenty of program listings which illustrate the use of many of the calls. Some of these are useful programs in their own right, for example, a printer buffer, and a supplementary program disc is available which contains them all, together with several extra utilities.

Both authors have worked for Acorn and clearly know their topic well. However, despite the complexity of much of the material, the book is written with a clarity often lacking in such works. For the experienced programmer who wants to explore the exciting facilities of the Archimedes, this book is excellent.

Its scope is neatly summed up: it is a highly readable, in-depth guide to the complexities of the Archimedes Operating System, applicable to both Arthur and Risc OS.

However, there are some aspects which are not covered at all, for example, sprites. I suspect that even if you have the PRM on your shelf, you will always turn to this book first.

UNIVERSAL TALK

Computer Translation of Natural Language by W Goshawke, I D Kelly, J D Wigg; Sigma Press; £12.95

This is more than just a book about machine translation. It contains a specification and an implementation of the translation system and a full program and sample dictionary listings to run in Basic on a BBC micro-computer. Anyone who wishes to become more involved with machine translation can register as a user of this system and may even assist with further developments.

Part 1 of the book is a readable, informative and amusing overview of machine translation by Kelly. The reader is taken from where machine translation was 30 years ago (making interesting mistakes such as translating 'Hydraulic Ram' into the equivalent of 'Water Goat'!), through the ALPAC report (1966) which virtually killed off all machine translation research for a few years, to the present day.

Part 2 by Goshawke details the 'Spoken Languages Universal Numeric Translation'. SLUNT has been specifically designed to run on any digital computer in the world by using an intermediate language or interlingua which consists entirely of the digits 0 to 9.

What does become clear in this section is that SLUNT is not yet complete and finalised. The basic framework has been specified but there is still more work to be done for translating to and from English, to and from other languages and for the handling of specialist vocabularies. Future developments will be coordinated and controlled by the authors, care of the Language Translation Group of the British Computer Society.

Part 3, the International Communication System (ICS), by Wigg, is an implementation of a sub-set of SLUNT, designed to run, primarily, on a BBC microcomputer. Some simplifications have been made to allow ICS to work within the limitations of a 32k machine. ICS is written in BBC Basic and a full listing, with comments, is given in the book. With minor modifications, which are also detailed, the program can also be run on an IBM PC. A checksum listing of the datafiles and programs are available on request or for the modest sum of £10 a BBC or IBM PC format disc can be purchased. For this price the recipient will also receive at least four ICS newsletters, which will detail further developments with SLUNT and ICS, and a more advanced version of the software when it becomes available.

I have tested the software on a BBC microcomputer and within its limitations it works – albeit rather slowly. Loading the program from disc takes around 45 seconds, translating from number language into French in around one minute 15 seconds for two of the short example phrases supplied on the disc, and about one minute 18 seconds for translating the phrase 'George is speaking to the teacher' into number language.

This is, however, a limitation of the BBC rather than the software; a compiled version running on an IBM PC AT runs extremely rapidly and for those of you lucky enough to own an Archimedes 440 (hard disc version) those timings become 2.3 seconds, 4.1 seconds and 6.2 seconds respectively (and that's just interpreted Basic!).

One feature I did find inconvenient was the fact that the program is case sensitive; 'George' cannot be input as 'george' or 'GEORGE'.

I would say that this book is essential reading for anyone involved with or contemplating becoming involved with machine translation. The overview is readable, informative and entertaining! The formal description of SLUNT may be a little heavy going for the average hobbyist, but the listings are well documented and the software worked well.

The implementation is crying out for a more powerful computer to speed things up and to allow for some of the limitations to be relaxed. I would definitely recommend this book and software to anyone exploring this area of computer applications. However, if you don't have access to an Archimedes or IBM PC AT (or compatible) then bear in mind that the implementation is going to be slow to run and limited by memory.

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Enthar 7 (Solution)
Exile (Helpsheet)
Terramex (Solution)
The Hobbit (Solution)
Citadel (Solution + map)
Plan B2 (Solution + map)
Spy Vs Spy (Helpsheet)
Spellbinder (Solution + maps)
Elixir (Solution + maps)
Paperboy (Helpsheet)
Twin Kingdom Valley (Solution + map)
Omega Orb (Solution + map)
Elite (Helpsheet + tips)
Tarzan (Solution + map)
Stranded (Solution)
Codename : Droid (Solution + map)
Thunderstruck (Solution + map)
Suds (Solution)
Philosopher's Quest (Solution + map)
Rick Hanson (Solution)
Thrust (Maps)
Last Ninja (Solution + maps)

Hoverbod (Passwords + cheats)
Frakl (Helpsheet)
Thunderstruck 2 (Solution + map)
Kourtyard (Helpsheet + map)
Dunjunz (Helpsheet + 25 maps)
Gisburnes Castle (Solution + map)
Palace of Magic (Solution + map)
Impact (Helpsheets + passwords)
Icarus (Helpsheet + maps)
Sphinx Adventure (Solution + map)
Anarchy Zone (Helpsheet + passwords)
Repton 2 (Helpsheet + 18 maps)
Bonecruncher (All passwords + maps)
Skirmish (Helpsheet)
Cholo (Solution)
Quest for Freedom (Solution + map)
Kayleth (Solution)
Starquake (Helpsheet)
Rick Hanson 2 (Solution)
The Hunt (Solution)
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Exile (Helpsheet - Part 2)

• ARCHIMEDES GAMES •

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Cheat It Again, Archie (Impact Software)	11.95	**Fireball** (Godax)	15.95
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M = Master Compatible

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IMPACT SOFTWARE (Discs are BBC B & Master Compatible 40/80)			
Orbital M	4.95	5.95	6.95
Clogger M	4.95	4.99	6.95
Zenon M	4.95	4.99	6.95
Cheat It Again, Joe 1	2.99	4.99	-
Cheat It Again, Joe 2	2.99	4.99	-
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Play It Again Sam 8 M*	6.90	8.90	11.25
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Question of Sport M	9.50	11.50	15.70
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Repton Infinity M	9.45	11.45	15.75
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REVIEWS

SOFTWARE

WHALES OF PROTEST

Dave Futcher saves the whale with a little help from Topologika

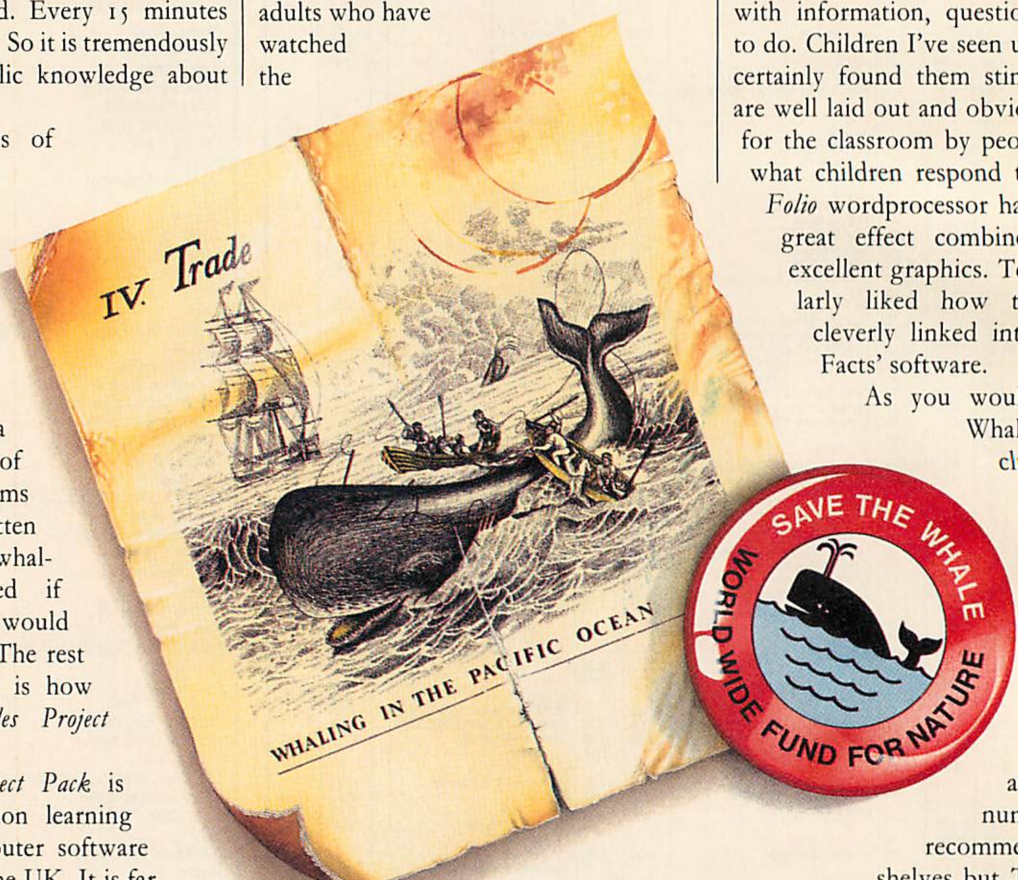
Despite an extensive round the world Save the Whale campaign the battle to save the whale is far from won. Whales are still being killed. Every 15 minutes one large whale dies. So it is tremendously important that public knowledge about whales is increased.

In 1987, Friends of the Earth in Liverpool received an intriguing letter from a computer soft ware company wanting to do just that. The letter was from Topologika and it said a series of computer programs were being written about whales and whaling and wondered if Friends of the Earth would be willing to help. The rest is history and that is how Topologika's *Whales Project Pack* started off.

The *Whales Project Pack* is the first conservation learning package with computer software to be published in the UK. It is far more than a few programs on disc. It is a truly substantial resource of books, posters, slides, an adventure game, a disc based whale encyclopedia, a simulation of whale migration, a computer based quiz and taped music. It is a package that is ideal for anyone at home or at school with an interest in whales.

Some of the material has been published for the first time by Topologika themselves while other bits have been collected together from sources around the world. Although available as a complete package it can also be purchased separately as a sort of mix and match set.

The best starting point to the pack is probably 'Saving the Whale' – an outstanding tape/slide presentation that will set the scene for the use of the rest of the material. Children and adults who have watched the



presentation found it excellent. The 40 colour slides present a balanced view of the history of whaling and the fight to control it. The tape with narration by Sir Peter Scott, is just right for junior school use.

The package will of course work in any slide projector but the pre-recorded cassette has been pulsed for use with a compatible automatic slide projector.

The set of eight A4 sized 'Whale Activity Sheets', many of four pages, provide an ideal basis on which teachers can build a theme on whales. The sheets start with an introduction to mammals and then move to whales and their habitat. They also cover hearing, sound and their birth.

The format for each sheet is similar, with information, questions and things to do. Children I've seen using the sheets certainly found them stimulating. They are well laid out and obviously produced for the classroom by people who know what children respond too. Tedimen's *Folio* wordprocessor has been used to great effect combined with some excellent graphics. Teachers particularly liked how the sheets are cleverly linked into the 'Whales Facts' software.

As you would expect, the Whales pack includes an extensive bibliography of books available about whales. Public libraries and many schools will already have a number of those recommended on their shelves but Topologika has included two offerings in the package that are unlikely to be available locally.

Gentle Giants of the Sea by the Whale Museum in the USA is a real classic. Its 214 pages are packed full of fascinating material and activities ideal for pupils' classroom or home based research. There are also notes for teachers and copyright free illustrations. This book has definitely been designed to be a teaching tool for a whole term's work.

The second book is published by Topologika. Realising there is nothing available on the myths and legends surrounding whales, Topologika commissioned David Forster to write one. It's a valuable collection of stories that have

ILLUSTRATION BY RICHARD DRAPER

helped make whales through the ages mysterious, feared and loved.

The software component of the *Whales Project Pack* has three discs of software. 'Whales Facts' is a sort of Whale encyclopedia. It is a menu driven database made up of a collection of mode 7 pages linked together. Children can move around the database by pressing single letters and it contains literally hundreds of facts about whales.

Graham Ragget, the author of 'Whale Facts' actually began collecting data to include in this disc of whale information in 1984 and he says it contains more information than a dozen books. Project work in school does throw up the most unexpected questions and 'Whale Facts' anticipates many of them.

Unlike some books, the information included is right up-to-date thanks to Friends of the Earth.

In addition to all the text that does seem to cover every conceivable fact about whales, the database also has some animated pictures of the Major Toothed and Baleen whales. Usefully, all pages can be dumped to a printer by just pressing the P key.

The second disc in the whale pack contains three programs. The 'Migration Game' is a quiz for up to 10 players or teams. Each player controls a migrating humpback whale and answers questions to move it on an on-screen map of the world along the 10 main northern and southern migration routes. The first whale to reach tropical waters wins.

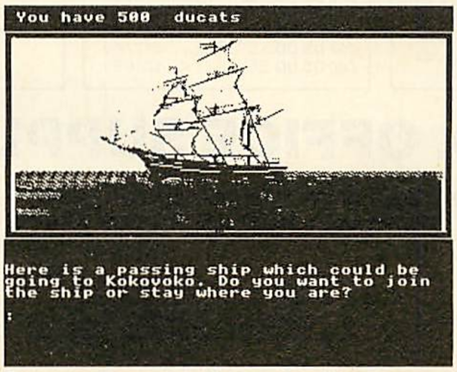
The game was designed as an ideal way to round up a class topic on whales although it could be used at any stage in a project. The program also has a useful utility which can be used by children to create their own datafiles.

Cetologists (people who study whales!) believe toothed whales can radiate sound in all directions and that they can focus this sound to 'see' things in much the same way as we focus our eyes.

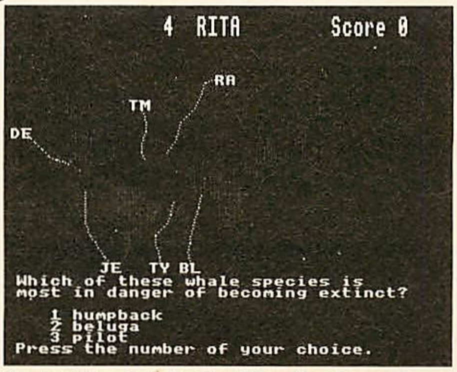
The program 'Ears that See' has been designed to give children an idea of the same experience. It trains the children to use sound to recognize lines and shape and ends with a game that tests children's mathematical shape recognition skills – they have to guess the shape before the great white shark gets them!

The third part of 'Whale Games' is a simulation entitled 'Save the Whale'. As it is an arcade type simulation it is far more appealing to children than the normal text only simulations. In the program a school of whales is migrating towards the equator to breed. As well as natural hazards like beaching to be overcome, the whales have to survive some pirate whalers.

Throughout the simulation the children take the part of the whale, steering them (usually in pairs) towards the breeding grounds at the top of the screen. The whales can dive and surface whenever they like. During the game the whalers are ever present and determined to get their foe. When submerged the whalers track the whales down with sonar and they have the help of a helicopter when the whale is moving on the surface. However, whenever a whale is threatened the conservation ship Rainbow can be moved in to help.



Queequeg's quest in the Whales Adventure



Saving the whale in the Migration Game

This part of the package soon becomes popular but teachers quickly realize that its arcade style does alert the children to the problems that real whales suffer on the way to their breeding grounds.

The third software component, 'Whale's Adventure' has just been added to the pack. It is a substantial graphics adventure written in three parts supplied on two sides of a disc.

The adventure is loosely based on the story of Moby Dick and sets out to explode that myth and others, putting the children in the role of Queequeg, heir to the throne of Kokovoko, a beautiful Pacific island whose economy totally depends on whaling.

When Queequeg's father, the King dies it is tradition for his crown to be thrown into the sea. Unfortunately a white whale – Moby – catches the crown in his huge jaw and carries it away. Queequeg cannot succeed to the throne until he has tracked down the crown and convinced his people they can live without whaling.

The adventure provides opportunity for problem solving of all kinds. It also provides experience of mapping skills, navigation, bearings and develops the understanding of conservation.

The *Whales Project Pack* is an outstanding collection of resources. It must be one of the best topic packs yet produced. Brian Kerslake, the pack's designer has managed to amalgamate computer software, books, posters, activity sheets and a tape-slide sequence in a unique and useful way. There is no doubt that the package has been brilliantly conceived and executed. The emphasis is a sensitive treatment of what is at times an emotive issue. Topologika is to be applauded for developing such a computer based conservation learning resource package.

This is just the kind of resource that schools need for real cross-curriculur studies and I recommend it for children from lower juniors to the top of the secondary school. I hope Topologika will be encouraged to do more.

The Whales Project Pack *is published by Topologika, PO Box 39, Stilton, Peterborough PE7 3AL. Tel: (0733) 244682. The complete pack can be purchased for £65. It is also possible to buy individual components of the pack separately as follows:* Whale Myths and Legends *by David Forster and Gary Jones costs £4.* Gentle Giants of the Sea *by the Whale Museum costs £13. The* Whales of the North Atlantic *poster by the British Museum costs £4. The Tape-Slide Set, Save the Whale by World Wide Fund For Nature costs £15 and the* Whale Activity Sheets *by Les Turner and Gary Jones costs £4. The* Oceans of Song: Whale Voices *Music cassette costs £8 from Pet Records and the computer software is available separately as follows: Whale Games by Tom Tuite: £18.40 Whale Facts by Graham Raggett: £18.40 and Whale Adventure by Tom Tuite: £22.*

Topologika promises that Friends of the Earth will benefit by a donation of 5 per cent of every sale of individual items or the complete pack.

INTERLUDE

MEMORY LANE

Ian Waugh gives some hints for Ample users along with some tips for increasing your memory. Plus all the latest in BBC micro music making

If you have a Master and have ever had a 'No room' error when using the Hybrid Music System the Stave Editor here's why. When using the Editor you will have noticed that the ATOS module is loaded every time you GET a word into the editor. It changes from mode 6 to mode 7 on a model B so it can't run out of memory. On a Master, however, using shadow RAM, you can.

If you use the Stave Editor regularly it is worthwhile loading ATOS permanently. It can be MLOADed:

```
"ATOS" MLOAD
```

or installed:

```
"ATOS" INSTALL
```

If it is MLOADed it can be deleted after use to free memory;

```
"ATOS" MDELETE
```

If it is INSTALLed it cannot be deleted but it may use up to 10 per cent less memory than if it is MLOADed. You pays your money and takes your choice.

Memory savers

Ample stores music lines and instructions in a very compact form. A piece of music takes about 1k of workspace while it plays and as you increase the size of the piece you may get a 'No room' error. However, you should still be able to run the piece by removing the current editor. Selecting the Run option from the main menu automatically deletes the current editor before playing.

Under normal circumstances you will then have about 10k of workspace. You can check the current state of memory using the MEM command (f6).

If memory is still tight there are a couple of simple checks you can make on your program to reduce its size. Begin by removing all comments.

Like Basic, Ample words are stored in tokenised form. System words are one byte long and user words are two bytes long so there's little to be gained by



Ample on the Hybrid Music system

shortening these. A single space takes up one byte. Multiple spaces only take two bytes no matter how many there are. If you eliminate all the spaces between words, you may save 100 bytes or more in a program.

However, make sure words like CHAN aren't followed by a word beginning with a capital S! Finally, make sure there are no words in the program left over from early developments which are no longer required.

You may be able to save even more memory by customising the !Boot file. We'll look at this in a later Interlude column.

Integra-B

If you have Computech's Integra-B expansion board and want to use it with the Hybrid Music System, insert the following in the !Boot file on your system disc before using *Basic:

```
*OSMODE 4
*SHADOW
*SHX ON
```

Music notes

■ Acorn has discovered a devastating bug in the new Risc OS ROM – it appears that there is an 8ms interrupt latency when using the desktop. This won't usually cause anyone any problems but in the case of MIDI applications it more or less kills MIDI reception.

■ Hybrid's Music 5000 Synthesiser Junior should now be well and truly available. Production delays were inevitably caused when Hybrid recently moved into larger premises.

New Ample releases

■ Many music teachers will be familiar with the music program *Compose* for the BBC. Now ESP has announced the production of Ample *Compose*. The program uses pictures to represent short music phrases which can be put together in any order to produce a tune.

■ In our February Interlude we reported that the BBC's CEEFAX service was about to begin transmission of Ample music by Amplinex members. This has been delayed due to legal problems over the broadcast of music software. However, a new contract has been produced and transmission should begin very soon.

■ The latest edition of Amplinex (009) includes a free disc containing 17 tunes written by members. Membership is only £5 but please also send a formatted disc, return postage and a mailer.

■ Response from Amplinex members indicates that very few log on to Music City, the area of Micronet devoted to the Hybrid Music System and BBC music. All complain about slowness of updates (which is apparently not Music City's fault but Micronet's). However, plans are afoot at Micronet to launch a brand new computer music area soon after it gets settled in at its new premises in Apsley near Hemel Hempstead.

■ If you have any musical tips you'd like to share, or if there are any topics you'd like to see covered in this column, please write to Interlude, *BBC Acorn User*, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.

Amplinex, 26 Arbor Lane, Winnersh, Berkshire RG11 5JD.

U-Music, 17 Parkfields, London SW15 6NH. Tel: 01-788 3729.

ESP, 75 Beechdale Road, Bilborough, Nottingham NG8 3AE. Tel: (0602) 295019.

Hybrid Technology Limited, Unit 3, Robert Davies Court, Nuffield Road, Cambridge CB4 1TP. Tel: (0223) 316910.

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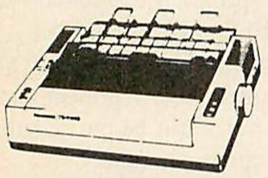
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FROSTY RECEPTION

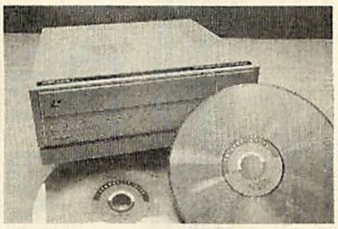
Thank you for devoting so much space to the announcement and review of the *North Polar Expedition* IV programme in your magazine (March 1989). I would like, if you will permit me, to take a little further space to give your readers a better view of our objectives in making this programme.

The 'tired question and answer format' is predicated by the necessity of using the tracker ball to meet our objective of group participation as opposed to one individual operating the keyboard. The Quiz format is actually based on the *Question of Sport* TV programme which seems quite popular!

The video content may have seemed almost superfluous to your reviewer but you didn't mention the more than 100 unique photographs and graph data on the Arctic environment, provided to facilitate further study of the subject.

Although all the moving video footage was gleaned from existing documentary material, only about 50 per cent has ever been seen publicly before and then only at off-peak hours in a very few ITV areas several years ago. Even if we wanted (and could afford) to film in the Arctic especially for this project, it is unlikely we would obtain Government permission to do so.

We decided to use a single bar of eight, small, self-explanatory icons across the bottom of the screen (hardly 'cluttered') which, for consistency, is permanently present



(how do you click on an icon that isn't there?). The design of the icons and windows is limited by the BBC screen graphics and by a desire to minimise the amount of 'flicker' inherent in this marriage of video and computer displays.

If some of the video picture is obscured, I am afraid we will have to wait for a superior method of picture representation such as CD-I.

You said 'there's little use of sound'. The reason we only used sound effects (ice movement, polar bears, etc.) is that it is impossible, with this technology, to provide significant amounts of voice-over explanation and a video picture without going into continuous play mode. Again we wait the advent of CD-I which, with its ability to handle picture and sound independently, will remove these restrictions.

Since our programme requires the use of a floppy disc to save the 'journey' and the daily log to disc, it seemed pointless to use the expensive and complex LV-ROM mastering process. We also wanted to respond to suggestions from pilot educational reviewers and thus match classroom management requirements more exactly. Although the future seems assured for Laservision and CD-ROM, that of LV-ROM seems less certain.

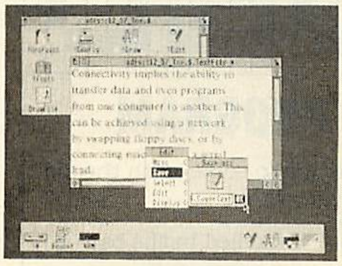
Perhaps some of the rationale for *North Polar Expedition* is now a little clearer. The programme generates a powerful team atmosphere even among mixed-ability groups and is highly motivating and enjoyable to use.

William Beckett
Virgin Publishing

TEETHING PROBLEMS

I have been the proud owner of an Archimedes 310 for two months now and I am very pleased with it. I am slowly learning the ins and outs of the machine but still get confused with some aspects.

I have read that there is no limit to the number of files you can have in an ADFS directory. However, I have twice been given the error message 'Directory full' whilst using my Arc.



I have also read somewhere that the Arc's Desktop is written in Basic. How can I therefore access it when there is no Basic program disc in the machine?

Finally, is it possible to save function key definitions in the same way as on the BBC micro – by saving the relevant area of memory?

Kevin Simpson
Brockley

An ADFS disc will theoretically hold a very large number of files. ADFS directories however, have a limit of 47 files or directories, or a mixture of both.

The original Archimedes desktop (present in Arthur 1.2) is in fact written in Basic. It is also held permanently in ROM in a special Desk Filing System (or 'DeskFS'). If you make sure you are in command mode on your Arc, and then type '*DESKFS <Return>' followed by '*CAT <Return>', you should get a list of files, including the Desktop program itself. This is not true with Risc OS though.

Function key definitions cannot be saved by just saving a part of memory. You could try creating a spool file of key definitions like so:

***SPOOL KeyDefs <Return>**
***SHOW Key$* <Return>**
***SPOOL <Return>**

The file will need editing before it can be *EXECed.



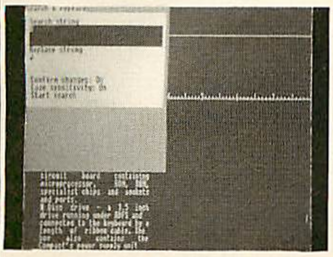
COVER UP COMPLIMENT

Like any red-blooded male, I appreciate the abundant charms of the young lady who advertises the games *Barbarian* and *Barbarian II*. At the same time may I thank you for the non-sexist stand you have taken over these advertisements. I wish other magazines were as high-minded as yourselves.

Pastor Kendall Down
Clwyd

POSTSCRIPT PUZZLE

I currently use *InterWord* for wordprocessing on my BBC micro and print using a Micro Peripherals printer (MP165) (Epson compatible). I have



access to a Postscript laser printer and wonder if there is a program available, perhaps in ROM form which will print my current document via Postscript.

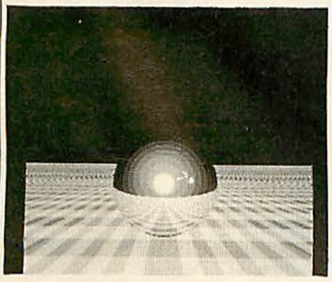
A McIntyre
Hornchurch

We don't know of any such program, although perhaps someone out there has delved further.

However, you may be able to write your own 'driver' program to use a text file created with *InterWord* to achieve the effects you are after. To help you, on page 72 of this issue you will find an introduction to Postscript.

TRACING BOOKS

With reference to your article in the May edition of *BBC*



Acorn User on ray tracing, I have encountered difficulty in obtaining the book *Illumination for Computer Generated Images* by Bui-Tuong Phong.

Could you supply details of where I might purchase this literature.

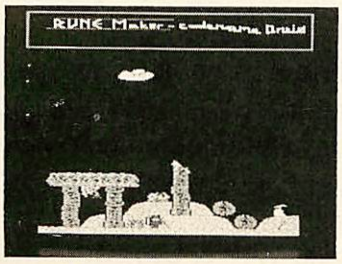
I would also like to congratulate you on an excellent article, a subject I have been attempting to approach but have been bewildered by. Your article was helpful and stirred me to delve deeper into this topic. I have already bought *The Fundamentals of Interactive Computer Graphics* and have produced 3D real-time animated graphics, making ray tracing the next step.

David Marvell
Stevenage

You might try Foyles in London as they have a large section of computer related material.

JUST THE ONE

I am writing to compliment you on the program you published in April's issue of *BBC Acorn User*, Rites of Spring by Chris Ruseman. I spent hours typing it carefully in only to find that it was full of errors and I was going to write a very different letter... until I checked my typing and found in fact there is only one error in listing 2, line 3750. It should read:



```
3750 PROCa(write,write,640-40)
```

I have not been buying the *BBC Acorn User* regularly for some time now as I find that it's too full of Archimedes subjects, so I have missed any article there may have been explaining the method used by Chris's program to chain successive Basic programs, all using the same variable.

If there has not been an article to cover these points maybe there ought to be. I should like to applaud the use of such useful variable names which seems to have dispensed with the need for remarks. I have learned a lot from this program but would like to learn more.

G Cane
Manchester

An article explaining how to 'pass' variables between programs is included in this very issue. See 'Running Variables', page 80 for more details.

ELECTRON ELECTIONEERING

The new-look *BBC Acorn User* is a welcome and refreshing change, as most readers will probably agree. The editorial stated that the revamped magazine would still endeavour to support all machines from the BBC model B through to the current Archimedes.

Well, I have noticed the continuing commitment to the BBC but I have not seen the same enthusiasm applied to the Electron. If the Electron is worthy enough for the front cover, surely some of the insides should be equally devoted to it.

I agree that the Archimedes is a new machine and will therefore have a large percentage of editorial. I do not, however, remember the Electron affecting the other ma-



chine coverage as much.

The Electron is now six years old and has a vast array of hardware add-ons – plenty of material for Electron coverage. It is likely that serious Electron users will have expanded machines so how about a column for 64k Electrons in the yellow pages compatibility table?

It's now coming up to almost a year since the last Electron specific review. Let's hope that there's going to be at least one per year!

Stephen Cusack
Cambridge

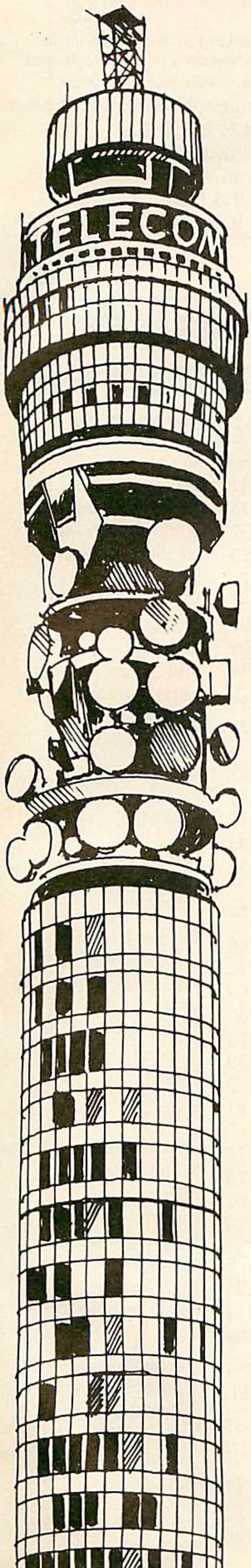
Although coverage of the Electron is something we hope to maintain, it hinges on the activities of Electron users and equipment manufacturers.

It is almost a year since the last Electron specific review because it is almost a year since the last Electron specific product was produced. Even *BAU* cannot review what isn't there.

As far as programs for the Electron are concerned, *BAU* would be interested in publishing good ones from any readers. However, there is almost no such thing as a standard Electron these days so it is difficult to publish a program which will be suitable for more than a handful of users.

Despite all this, there are plans afoot for some Electron specific coverage in the near future. Watch this space for details.

SOFTWARE PACKAGES FOR SCHOOLS



British Telecom has produced three new science-based software packages for schools in collaboration with the Computers in the Curriculum Project, Kings College, University of London.

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This program allows the student to investigate how, by Pulse Code Modulation, and analogue signal – speech, sound and video – are converted (coded) into digital pulses, transmitted and decoded back into a replica of the original analogue signal. The written material includes information on the conversion process, sampling, frequency levels, distortion and how PCM equipment is utilised in the construction of telephone systems.

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This interactive icon driven program provides students with the opportunity of devising a telephone link, requiring them to set up, transmit and receive a comprehensible signal from one exchange to another.

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Sinclair portable Oscilloscope and Sinclair Multimeter, boxed. Will swap for BBC B disc drive. Tel: (0780) 83458 (eves).
Wanted Monitor for BBC B, colour and good resolution for wordprocessing. Tel: 01-359 2125.
Wanted AMX Mk III mouse and *SuperArt* for compact. Tel: Derby (0332) 702779 (eves).
Wanted Z80 second processor and Cobol compiler. Tel: (034381) 3348.
Wanted BBC Z80 second processor CPM disc and user pack if possible. Tel: Lewis 01-892 0013 (reverse charges accepted).
Wanted for BBC B 1770 DFS, replay or other foolproof tape to disc system. Modem and software. Tel: Mark (08462) 77104 (eves).
Wanted Archimedes software, reasonably cheap, *First Word*, Ansi C, Pascal PC emulator, games. Tel: Andrew 041-221 0129.
Wanted BBC model B micro in working order. Tel: Phil (0268) 757628.
Wanted BBC B Mother board, Issue 4, or later. DFS nor 65xx chips not required. Tel: Alec 01-549 1626.
Wanted BBC B and drives or printer and drives. Swap Panasonic G40 video. Perfect and immaculate, under guarantee. Tel: (09404) 381.

FREE PERSONAL AD SERVICE

Fill the form below to a maximum of 20 words (one in each box) and send it to *BBC Acorn User* Free Ads, 20-26 Brunswick Place, London N1 6DJ. Please use capital letters, write clearly, and remember your name, address and telephone number. Without this full information, supplied on a separate sheet of paper, we regret we cannot carry your Free Ad. We cannot accept entries selling or swapping software. This is a service to readers – no companies please. One entry per form only. Free Ads are carried in the magazine as space permits, and any Free Ads not used within a month of receipt will be disposed of.

ACORN USER'S

DIARY

Are you obsessed?

Has your computer become an obsession? Are you devoting your entire body and soul to the demands of your beloved machine? Christina Neal reveals whether your expert touch is becoming too much!

1. You're typing in a listing when friends call and ask you to join them on a night out. Do you:

a) Reluctantly agree but leave early to return to your one and only (your micro).

b) Refuse. You don't know what else to do with your hands.

c) Join them for a few pints and wonder why there's beer in the keyboard the next morning?

2. When was the last time you noticed a woman?

a) Just now in the street – computer or not computer, you're quite a ladies' man really.

b) At the last *Acorn User* show. Maybe she was as wrinkled as yer grannie but she could program.

c) A what?

3. Which of the following do you consider most important in your life?

a) Developing your computer expertise and growing your beard.

b) Your family – when they listen to you ranting on about your vast games collection.

c) A good read of *BBC Acorn User* – you may be a confirmed looney but it's something you do in style!

4. Which of the following do you consider most trivial?

a) Washing

b) Seeing daylight.

c) Eating.

5. What's your idea of a fun evening?

a) Out on the razzle. You're just like any other male, really (except for the long hair!)

b) A romantic night for two – just you and your micro?

c) Inviting a group of mates round and ignoring their yawns while you demonstrate the many wonders of your machine?

CHECK YOUR SCORE! 1. a) 2 b) 3 c) 1. 2. a) 1 b) 2 c) 3. 3. a) 3 b) 1 c) 2. 4. a) 3 b) 2 c) 1. 5. a) 1 b) 3 c) 2.

10-15 points: Serious help required. Your missus/family/hamster will confirm your computer has plenty to answer for! You love it. You live for nothing else! You'd sit naked on Nelson's Column if it was the only way to reach your micro!

5-10 points: You'll tinker with your computer all right, but, happily, you're not obsessed. You give a night out and an evening's key bashing equal rating. That's fine but work hard to keep things that way, you'd be surprised how easily a hobby can turn into an obsession!

0-5 points: There's little chance your computer's getting the better of you. You enjoy a good hack but only when the girlfriend's washing her hair! That said, your computer will always be a hobby and *BAU* will always be mag.

Amazing what a zero can do

This month Orson Fact exclusively announces the Acorn R14, a Risc-based Unix machine for less than £400. This is the bargain machine to beat all-comers.

C&D Cmputnig last month revealed that Acorn's R140 Unix workstation looks too expensive when compared with a new machine from the mighty Digital Equipment Corporation. The DecStation 3100 was described as a Risc-based machine capable of running DEC's version of Unix, and VMS, the VAX operating system, as fast as a VAX – all for the amazing price of $1100 (or about £900 in the UK).

However, with the new R14, Acorn has confounded it's critics, and produced a machine with the same performance for a tenth of the price.

No matter

Free with every copy of *Archway*, a programmer's toolbox from Simtron for writing Wimp applications for the Arc is what can only be described as a beer mat.

Suggested applications have ranged from a late-night cocoa stand (to stop the drips staining the table) to an economy sized mouse mat. A (very) small prize to anyone who can suggest a better use.

BIRTHS

A 649lb (+FAT) bouncing baby boy, Archibald to Mr and Mrs 3000 at Cherry Hinton Maternity Home, Cambridge. Motherboard and child both doing well.

DEATHS

Orson Harvey Fact
1982-1989

The whole of Redwood was reeling tonight after the shocking news of the death of ace reporter Orson Fact.

Fact was contributing up-to-the-minute Acorn Abuser Diary stories to *Acorn User* from the first issue and his ceaseless investigations continued right up to the last moments.

Fact broke many major stories in the course of his career and dedicated his life both to journalism and to this magazine. In January this year he even offered to change his name by deed poll to BBC Orson Fact.

Orson Fact will be sadly missed by everyone who never met him and in his honour a two minute silence has been printed on the cover of this issue.

LOST AND FOUND

Readers searching for the comma missing from line 3750, listing two of the Codename Druid program in the April issue of *BAU* will be pleased to know it has at last been located and is reprinted here.

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Jet Fighter
£14.95


Sales Ledger
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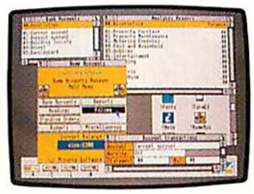

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Card Index (BBC) £64.95


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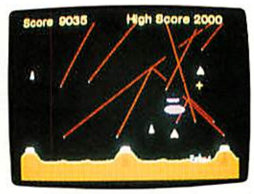

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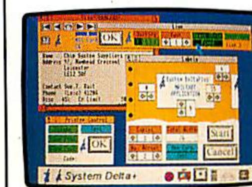

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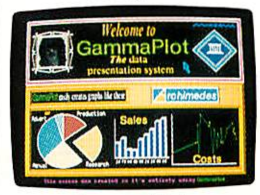

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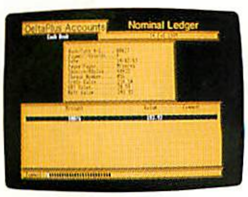

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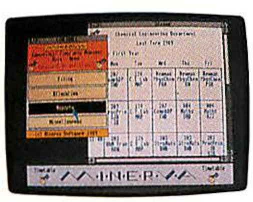
Need we say more?

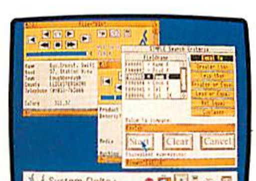

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PLAY IT AGAIN SAM 9

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Sixty action-packed screens... battling with fireballs against demons, witches and the Knights of the Round Table. Can you find Excalibur and defeat the fiery dragon? CAMELOT takes over where CITADEL and QUEST left off.

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A Superior Hit





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All the thrills and intrigue of the world of espionage... which even "the book" couldn't reveal!
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A Superior Hit





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PLAY IT AGAIN SAM 9 for the BBC Micro and Acorn Electron

Superior has combined a top-quality brand-new release with three recent smash hits. The result is an action-packed four game compilation that combines variety with great value for money. Don't miss it for your collection!

BBC Micro Cassette	£9.95	Acorn Electron Cassette	£9.95
BBC Micro 5¼" Disc	£11.95	BBC Master Compact 3½" Disc	£14.95

(Compatible with the BBC B, B+ and Master Series computers)

Please make cheques payable to "Superior Software Ltd".

(The screen pictures show the BBC Micro versions of the games.)

HAVE YOU GOT THE COMPLETE COLLECTION?

All these previous PLAY IT AGAIN SAM four-game compilations are still available from your local dealer or direct by mail order from Superior Software. Prices are the same as for Play It Again Sam 9.

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- PLAY IT AGAIN SAM 3 - Commando, Palace of Magic, Killer Gorilla, Killer Gorilla 2
- PLAY IT AGAIN SAM 4 - Frak!, Spellbinder, Cosmic Camouflage, Grand Prix Construction Set (BBC Micro only), Guardian (Electron only)
- PLAY IT AGAIN SAM 5 - Imogen, Elixir, Bug Blaster, Fortress (BBC Micro only), Moonraider (Electron only)
- PLAY IT AGAIN SAM 6 - Galaforce 2, Hunchback, Hopper, The Sentinel (BBC Micro only), Video's Revenge (Electron only)
- PLAY IT AGAIN SAM 7 - Firetrack, Bonecruncher, Snapper, Ghouls
- PLAY IT AGAIN SAM 8 - Winter Olympiad 88, Quest, Around the World in 40 Screens, Mr. Wiz

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